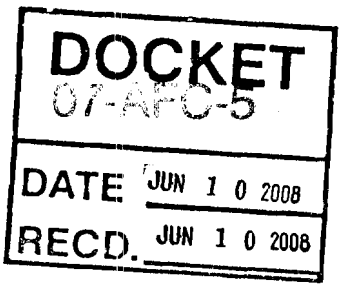
CH2M HILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833
Tel 916-920-0300
Fax 916-920-8463

CH2MHILL

June 10, 2008
File No.: 04.02.06.02
Project No. 357891



Mr. Che McFarlin, Project Manager
California Energy Commission
Systems Assessment and Facilities Siting Division
1516 9th Street, MS 15
Sacramento, CA 95814-5504

RE: Data Response, Set 2A
Ivanpah Solar Electric Generating System (07-AFC-5)

Dear Mr. McFarlin:

On behalf of Solar Partners I, LLC, Solar Partners II, LLC, Solar Partners IV, LLC, and Solar Partners VIII, LLC (Applicant), please find attached one original and 12 hard copies of Data Response, Set 2A, which provides a supplemental response to Staff's Data Request 23, dated May 8, 2008.

Five E-size sets of the Grading and Drainage plans (part of Attachment DR130-2) are being provided to the CEC and BLM staffs.

Please call me if you have any questions.

Sincerely,

CH2M HILL

John L. Carrier, J.D.
Program Manager

Enclosure
c: POS List
Project File

Ivanpah Solar Electric Generating System (ISEGS)

(07-AFC-5)

Data Response, Set 2A

(Responses to Data Requests: Air Quality, Alternatives, Biological Resources, Closure & Restoration Plan, Cultural Resources, Project Description, Soil & Water, and Visual Resources)

Submitted to the

California Energy Commission

Submitted by

Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC

June 10, 2008

With Assistance from

CH2MHILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833

Contents

Introduction

Attached are Solar Partners I, LLC, Solar Partners II, LLC, Solar Partners IV, LLC, and Solar Partners VIII, LLC (Applicant) responses to the California Energy Commission (CEC) Staff's data requests for the Ivanpah Solar Electric Generating System (Ivanpah SEGS) Project (07-AFC-5). The CEC Staff served these data requests on May 8, 2008, as part of the discovery process for Ivanpah SEGS. The responses are grouped by individual discipline or topic area. Within each discipline area, the responses are presented in the same order as CEC Staff presented them and are keyed to the Data Request numbers. New graphics or tables are numbered in reference to the Data Request number. For example, the first table used in response to Data Request 15 would be numbered Table DR15-1. The first figure used in response to Data Request 15 would be Figure DR15-1, and so on. AFC figures or tables that have been revised have "R1" following the original number, indicating revision 1.

Additional tables, figures, or documents submitted in response to a data request (supporting data, stand-alone documents such as plans, folding graphics, etc.) are found at the end of a discipline-specific section and may not be sequentially page-numbered consistently with the remainder of the document, though they may have their own internal page numbering system.

The Applicant looks forward to working cooperatively with the CEC and BLM staff as the Ivanpah SEGS Project proceeds through the siting process. We trust that these responses address the Staff's questions and remain available to have any additional dialogue the Staff may require.

Air Quality (117-120)

BACKGROUND

The January 14 responses to air quality data requests 11 and 12 refer to letters of coordination with Mojave Desert Air Quality Management District (MDAQMD). These letters, in general, seem to indicate that only developed or proposed projects in the California side of Ivanpah Valley have been considered. Several existing developments in the Ivanpah Valley on the Nevada side of the State line have the ability to contribute to the cumulative impacts and should be considered, i.e., proposed and existing power plants.

DATA REQUEST

117. Please clarify responses to Data Request 11 to include consideration of developments in Nevada. Specifically, address the existing power plant at Primm.

Response: The Bighorn Power Plant is more than 6 miles away from the project site. It is, therefore, outside of the area normally considered for cumulative impacts in CEC proceedings. More importantly, however, this facility is an existing power plant and thus part of the environmental baseline. It was commissioned in 2004, and therefore, its impacts are already included in the existing ambient background measurements described in the Environmental Setting sections of the AFC.

BACKGROUND

Facility Emission Impacts May Be Underestimated

Calculations of criteria air contaminants, provided in the August 2007 Application for Certification (AFC) and its appendices, for the facility appear to underestimate emissions. Page 5.1-27 of the AFC states that the construction of each phase of the facility would last approximately 24 months, and that overlapping of construction of the three phases would occur. The air quality impact analysis, contained in the AFC, includes two distinct, separate phases of construction and operation as if they are not overlapping with each other or operation. Because of this, staff believes that the facility operational emission impacts may be underestimated. Staff asked for this information in the initial set of data requests (as Data Request No. 9) and have not yet received a response.

DATA REQUEST

118. Please provide a revised air quality impact analysis to identify the facility's impacts for the special cases:

    a. If and when Ivanpah 1, 2 or 3 construction activities overlap;

Response: A detailed summary of the activities associated with construction of all three units was included in the original AFC (Attachment 5.1-F). This attachment shows the overlap of construction activities in the most aggressive construction schedule. The air quality impacts of construction activities that were reported in the original AFC are based on the month with the highest emissions, which occurs during the period when construction of Ivanpah 2 and Ivanpah 3 overlap.

b. When Ivanpah 1 is in operation and Ivanpah 2 and/or 3 are under construction; and

Response: As requested in the initial data request (dated December 12, 2007), supplemental modeling was performed to quantify the combined impact of operation of Ivanpah 1 and construction of Ivanpah 2. (See Data Response 9, Set 1D).

c. Ivanpah 1 and 2 are operational and Ivanpah 3 is under construction.

Response: As requested in the initial data request (dated December 12, 2007), supplemental modeling was performed to quantify the combined impact of operation of Ivanpah 1 and 2 and construction of Ivanpah 3. (See Data Response 9, Set 1D).

BACKGROUND

Construction Activities' Emissions and Mitigations

The AFC, page 5.1-44, states that construction equipment and activities may cause up to 386 pounds (lbs) per day of ozone precursors (363 lbs of oxides of nitrogen (NOx) and 22.96 lbs of organic compounds (VOC)), and 190 lbs per day of particulate matter (PM10/PM2.5) during construction of the project. It also states that the construction activity related emissions are "...short term"; to imply that offset mitigation may not be needed. According to the same AFC, page 5.1-27, the construction of the facility can last from four to six years. During this time, the facility construction emissions (ozone precursors and particulate matter) can contribute to the existing violations in the Mojave Desert air district of the state ozone and PM10/2.5 air quality standards.

DATA REQUEST

119. Please identify additional mitigation, such as emission reduction credits or offsets, that could address the residual impacts of construction and operation related NOx, VOC and PM 10/2.5 emissions.

Response: The Mojave Desert Air Quality Management District sets thresholds for significance for projects within its jurisdiction in the District's Regulations. In addition, the District has published CEQA and Federal Conformity Guidelines (MDAQMD CEQA Guidelines, June 2007). With respect to emissions for operations, the Ivanpah project's operating emissions are well below the significance criteria and thus no further additional mitigation is required. With respect to construction-related impacts, because the construction emissions of NOx and PM10 are above the significance criteria, Applicant proposes to follow the steps outlined below to avoid and minimize these potential impacts.

Operation Related Emissions

Regarding the use of emission reduction credits or offsets as mitigation for operating emissions, the District has adopted emission offset regulations as part of its responsibility to attain and maintain state and federal ambient air quality standards. The District has established *de minimis* levels for a facility's obligation to explicitly provide offsets for emission increases. Facilities with emissions above the threshold must provide emission offsets. The regional impacts of facilities with emissions below the thresholds are managed by the District in its planning and rulemaking activities. With operating emissions below the District offset thresholds, any potential impact of the project's operating emissions have been identified and accounted for in the District's Regulations. (MDAQMD Regulation XIII, Rule 1303 (B)(1).)

It is important to note that the District Regulations setting thresholds of significance for operating emission were approved in a NEPA- and CEQA-compliant process. Specifically, MDAQMD Regulation XIII was submitted and approved as part of the State Implementation Plan (SIP). (Approved 11/13/96, 61 FR 58133, 40 CFR 52.220(c)(239)(I)(A)(1).) Thus, compliance with the MDAQMD Regulations and Guidelines demonstrates compliance with the SIP provisions approved pursuant to a NEPA- and CEQA-compliant process.

Construction Related Emissions

The MDAQMD Regulations and Guidelines do not impose specific mitigation requirements or programs for projects that have temporary construction-related potentially significant air quality impacts. However, the South Coast Air Quality Management District CEQA Guidelines (1993) provide guidance that is frequently cited in other jurisdictions for the purposes of addressing construction-related impacts. Specifically, the SCAQMD Guidelines provide a list of maximum feasible construction emission minimization and mitigation measures. The Ivanpah project will use the construction minimization measures identified by the South Coast Air Quality Management District CEQA Guidelines, as well as those expected to be required by the Commission, as appropriate mitigation for construction activities.

With regard to the use of emission reduction credits or offsets as mitigation for construction emissions, any offsets that are provided for operating emissions will be surrendered prior to commencement of construction, and will therefore partially mitigate construction emissions. The District is, for public policy reasons, opposed to the use of permanent ERCs as offsets for temporary activities. ERC markets in many California Districts are close to the breaking point; consumption of ERCs, when not required by District regulations, makes those ERCs unavailable for the projects that need them, and upsets the balance between progress towards attainment and economic development that is embodied in District Air Quality Plans.

BACKGROUND

Mitigation Measures

Section 5.1.8 of the AFC states that the Ivanpah project represents a net emission reduction of all air contaminants because its electrical power would displace new fossil-

fuel based power plants. Therefore, the AFC implies that no offset mitigation is needed for the project. Staff has concerns with this argument because of several unsupported assumptions, including that new electrical power would have been generated from fossil-fueled type power plants, and that these fossil-fueled plants would have been located in the Mojave Desert air district. Additionally, if the Ivanpah project displaces existing fossil-fueled generation, the potential emission reductions may not be permanent or enforceable, and may not be in a region that the reductions provide net air quality benefits.

DATA REQUEST

120. Please identify measures including, but not limited to, offsets designed to mitigate the project impacts on the local and regional ozone and particulate matter air quality standards. These could include enforceable electricity "displacements" that provide air basin specific emission reductions.

Response: The power produced by the project will, without question, displace other power production. The power that will be displaced is the marginal power production that would have been dispatched if Ivanpah SEGS's power was not available. While it is impossible to state with certainty which specific power production will be displaced, it is possible to make assumptions that are sufficiently conservative to be able to state with certainty that the actual reductions are higher than the project's emissions. For example, it is beyond question that most of the displaced power production will come from fossil power plants; this is because California regulators require each utility to have sufficient traditional capacity to meet demand even if renewable sources (such as wind or solar) are offline. If Ivanpah SEGS is offline, the demand must be met by traditional sources. If Ivanpah SEGS is online, the traditional sources are not operated. Additionally, California's Renewable Portfolio Standard (RPS) requires load serving entities to obtain an increasing percentage of their resources from renewable resources. These facts distinguish renewable resources like Ivanpah SEGS from new conventional power plants.

In addition, solar thermal power production is coincident with the peak electricity demands of the State. Summer peak power needs in California are driven largely by air conditioning needs in the summer. It is during these peak summer days that California must rely on all of its generating resources, including the older, less efficient and thus more polluting sources (on a per megawatt-hour basis). Solar thermal production is coincident with the peak, and thus, will be greatest when it is hot and California's air conditioning load is the greatest. The availability of solar thermal resources during the peak means that older, less efficient units can either be displaced completely or "back down" sooner, running less, when solar thermal capacity is available to meet peak power needs.

It is likely that at least some of the displaced power production will come from high emission sources such as peaking facilities. It is likely, but less certain, that much of the displaced power would come from existing older power plants with emissions that are higher than current BACT levels.

The AFC included a calculation of displaced emissions based on current BACT levels achievable by a well-controlled gas turbine (see AFC Section 5.18). The analysis, therefore, underestimated displaced emissions by not considering displacement of dirtier sources. Even with this conservative assumption, on an annual basis, the project would displace four times as much ozone precursors as it would generate, and eight times as much PM_{10} as it would generate. This is because 95 percent of the power generated by Ivanpah would come from the sun instead of from fossil fuel combustion.

These estimates can be said, with certainty, to understate the actual emission reductions that will result from the project. It is more difficult, however, to demonstrate with similar certainty the portion of the reductions that would occur in the region, though PG&E will use electricity generated by Ivanpah SEGS to meet its RPS goals. However, if only 25 percent of the power production displaced by this project occurs in the region, the region will see a net air quality benefit as a result of the project; other regions will enjoy a benefit without direct impacts at all.

Alternatives (121-123)

BACKGROUND

Alternatives
In Section 6.0 Alternatives, page 6-8, Section 6.2.2, Alternatives Carried Forward for Further Analysis of the Application for Certification (AFC) four alternative sites are considered as well as the proposed Ivanpah SEGS site. Each alternative site is described very generally and all are shown on a single large scale map (Figure 6.1-1 General Locations of Alternative Sites).

In late March of 2008, PG&E issued a press release stating that it has entered into a contract with BrightSource Energy to purchase power from the ISEGS Project and a future project at Broadwell Lake east of Barstow in San Bernardino County. BrightSource is apparently pursuing permitting of the Broadwell Lake site with the Bureau of Land Management, so is likely acquiring environmental baseline information for that site.

DATA REQUEST

121. Please provide a detailed map (at least 1:24,000) showing the most likely project boundaries for the Siberia and Broadwell Lake Alternative sites described in AFC Section 6.2.2.

Response: As stated in Applicant's May 29, 2008 letter, the Applicant objects to this data request as requesting confidential information. Without waiving this objection, Applicant provides the following response using publicly available information. Applicant understands that the CEC obtained copies of Applicant's SF 299 filings for the Siberia and Broadwell Lake projects from the BLM Needles and Barstow Field Offices. Beyond the subject SF 299 filings, Applicant does not have any additional publicly available information on these projects.

122. Please provide a detailed map (at least 1:24,000) showing the linear components and access roads that would be associated with the Siberia and Broadwell Lake Alternative sites described in AFC Section 6.2.2.

Response: As stated in Applicant's May 29, 2008 letter, the Applicant objects to this data request as requesting confidential information. Without waiving this objection, Applicant provides the following response using publicly available information. See Data Response 121.

123. Please provide copies of all baseline environmental information you have acquired for the Siberia and Broadwell Lake Alternative sites described in AFC Section 6.2.2, particularly in the following subject areas:

a) Biological Resources: AFC Section 6.2.3.2 states that the Broadwell Lake and Siberia Alternative sites are expected to contain similar habitat conditions as

the Proposed Project site. It also states that a California Natural Diversity Database (CNDDB) search was performed at a 10-mile radius from these alternative sites and revealed several special-status species. Please provide the results of the CNDDB search for the Broadwell Lake and Siberia Alternative sites and evaluate the potential for occurrence of each species as well as any other biological background materials you have available.

Response: As stated in Applicant's May 29, 2008 letter, the Applicant objects to this data request as requesting confidential information. Without waiving this objection, Applicant provides the following response using publicly available information. See Data Response 121.

b) Cultural Resources: AFC Section 6.2.3.3 states that the proposed site and four alternative sites carried forth for further analysis would have similar potential for cultural impacts. Table 6.2-3 further states that a cultural resource database search was not conducted for the Siberia and Broadwell Lake Alternative sites. Please provide a Clearinghouse search (Class I) for recorded sites identified within the potential Siberia and Broadwell Lake sites, as well as any cultural resource research materials available.

Response: As stated in Applicant's May 29, 2008 letter, the Applicant objects to this data request as requesting confidential information. Without waiving this objection, Applicant provides the following response using publicly available information. See Data Response 121.

c) Water Resources: AFC Sections 6.2.2.4 and 6.2.2.5 say that little is known about water resources in either the Siberia or Broadwell Lake site areas. Please provide any information about water resources at these two sites that has been acquired since the submittal of the AFC.

Response: As stated in Applicant's May 29, 2008 letter, the Applicant objects to this data request as requesting confidential information. Without waiving this objection, Applicant provides the following response using publicly available information. See Data Response 121.

Biological Resources (124)

BACKGROUND:

Data request 17 stated: Provide status and progress updates on the anticipated schedule (including estimated dates) for submitting the Biological Assessment (BA) and consulting with the California Department of Fish and Game (CDFG) regarding rare plant and desert tortoise impacts. The data request response stated: A draft BA was prepared by CH2M HILL and submitted to the BLM on October 30, 2007. The BA will be submitted to the United States Fish and Wildlife Service (USFWS) by the BLM upon the completion of their review of the document. Meetings with CDFG will be scheduled within 60 days of submittal.

BLM has reviewed the draft BA submitted on October 30, 2007. In general, BLM has determined that more effects analysis is needed, and specifically, protective measures for the desert tortoise on the gas pipeline and water pipeline portions of the project are lacking incomplete, inaccurate, or confusing. Also, the desert tortoise protective measures need to be organized to reflect whether or not they apply to construction, or to operations and maintenance. Applicant will need to incorporate the protective measures into the proposed action. BLM is concerned other agencies such as the US Army Corps of Engineers and the State Water Resources Control Board (SWRCB) may require additional mitigation measures or changes to the project that will affect the project footprint therefore changing the proposed action. Changes to the project proposed action must all be made prior to submission of the BA to the USFWS.

DATA REQUEST:

124. The following requests are based on BLM review of the Draft Biological Assessment for the Ivanpah Solar Electric Generating System Project (October 2007); hereinafter referred to as the ISEGS draft BA:

- Change use of the word "will" in this document to "would.
- This consultation is on the *desert tortoise*. Refer to this species as such throughout the document. Please replace "covered species" with "desert tortoise" throughout the document.
- Update the BA as outlined in attachment #1, Biological Assessment Comments. Please coordinate with Charles Sullivan (BLM Needles Field Office) concerning questions on these sections of the BA that require modification.

Response: As stated in Applicant's May 29, 2008 letter, an additional 30 days has been requested to respond to this data request. We will include data from our recent Spring Survey in the revised BA.

Closure and Restoration (125)

BACKGROUND

Section 5.2.11.1, Mitigation Measure 1 – Site Rehabilitation Plan, addresses closure of the project following the cessation of facility operations and discusses elements of a closure plan. Data Request 30 asked for description of the likely components of a closure plan addressing decommissioning methods, timing of any proposed habitat restoration and restoration performance criteria. Applicant's response suggests that each project owner file a closure plan for review and approval at least 12-months prior to commencing the closure activities. BLM believes that the applicant must prepare a plan that addresses closure and restoration activities and that waiting to address the issues at the end of the useful life of the facility, will not ensure satisfactory restoration of the site in the fragile desert environment. In addition, the project design and footprint may need to accommodate vegetation salvage and/or propagation study plots. Further, the plan needs to recognize that closure activities may not only occur at the end of a 30 or 50 year life of the facility, but could happen at intermediate times during the project life.

DATA REQUEST

125. BLM requests the applicant develop a plan that will guide site restoration and closure activities. Initially the plan will describe the anticipated methods applicant proposes for revegetation of disturbed areas using native plant species including perennials, and will include methods used to monitor restoration of and evaluate success of revegetation efforts. The initial site restoration and closure plan will evaluate existing information gathered by applicant and other relevant studies to determine if existing data is sufficient to guide restoration of disturbed lands or if additional research is necessary to determine the most effective means to restore and revegetate the site at closure. The plan must address preconstruction salvage and relocation of succulent vegetation from the site to either an onsite or nearby nursery facility for study and propagation of seed sources to reclaim the disturbed area. In the case of unexpected closure, the plan should assume restoration activities could possibly take place prior to the anticipated lifespan of the plant. Specifically the closure and restoration plan must address the following:

    - Develop a revegetation research program based on information provided by a qualified expert in desert flora and revegetation. The program would include a review of available materials describing methods and success rates of revegetation programs in the Eastern Mojave Desert at similar elevations.
    - A program to evaluate existing native plant vegetation data from the current inventories and identify proposed representative study plot locations within

and adjacent to the project area for each of the four vegetative community subtypes cited in the AFC, Appendix 5.2B. This data will be used to identify dominate species to be used in revegetation. Baseline vegetation measurements from the project area and from surrounding non-disturbed areas must be established prior to any surface disturbing activities and will be used to evaluate and monitor vegetation trends and changing conditions over the life of the project that could be considered impediments to restoration activities (e.g. sustained drought). Prepare and submit a protocol to identify study plots and methodology to evaluate trends to BLM for review and approval prior to beginning studies.

- Identify the extent of succulent plant species to be salvaged and maintained in nursery areas either on site or in close proximity, that would be used for future transplanting and/or in propagation studies for seed sources.
- Monitoring and treatment of invasive species over the life of the project.
- Ground preparation procedures that would be needed to effectively reclaim the area.
- Implementation of monitoring programs after closure to verify revegetation results based upon the established goals for density and diversity.
- Provide yearly updates to agencies of progress achieved in connection to revegetation research.
- Identify, with justification, the vegetation considered unnecessary for revegetation or reclamation research that would be lost during construction that could be made available for public collection through plant salvage sales conducted by BLM.

Response: As stated in Applicant's May 29, 2008 letter, an additional 60 days has been requested to respond to this data request.

Cultural Resources (126-129)

BACKGROUND

The California Register of Historical Resources (CRHR) eligibility status of and the proposed project's effects on the Boulder Dam-San Bernardino 115-kV line, CA-SBR-10315H, and related cultural resources have been the subject of an ongoing discussion among the applicant and the staffs of both the Energy Commission and the Bureau of Land Management (12/12/07 Data Requests 36–39 (CEC Log No. 43714), 5 February 2008 Energy Commission Staff Comment on Response to Data Request 37, and 6 February 2008 BLM Staff Comment on Applicant's Draft Survey Report). The BLM and the State Historic Preservation Officer concluded a consensus determination on 22 October 1993 that the subject transmission line was eligible for inclusion in the National Register of Historic Places, and, as a consequence of this consensus determination, pursuant to 14 CCR § 4851(a)(1), it was automatically listed in the California Register of Historical Resources.

It is the opinion of the Energy Commission and BLM staffs that the interconnection of the proposed project to the transmission line could cause a substantial adverse change in the ability of the CRHR-listed line to convey its historical significance, which constitutes a significant impact under CEQA. Energy Commission staff needs a CRHR eligibility status assessment that is less than five years old for the Boulder Dam-San Bernardino 115-kV transmission line, so the line's eligibility needs to be reassessed, including an evaluation of the physical integrity of the line, the project's impacts on the line's ability to convey its significance, and the possibility that the line is one element of a historic district that encompasses multiple linear facilities within the entirety of the original BLM Right-of-Way (R.O.W.) Grant No. R 01730 to the Southern Sierras Power Company.

To accurately gauge the project's potential impact on the Boulder Dam-San Bernardino 115-kV transmission line, staff needs a detailed description of the precise character of the project's interconnection to this line. The description of the interconnection to the transmission line and to the larger R.O.W. historic district needs to provide sufficient detail for staff to assess the scale of the effect on both resources and to develop appropriate mitigation measures, if that effect is ultimately found to be a substantial adverse change in the significance of one or both resources.

DATA REQUEST

126. Please have a qualified architectural historian assess whether the Boulder Dam-San Bernardino 115-kV line (CA-SBR-10315H) and linear archaeological feature CA-SBR-12574H are resources that share a historical association as contributors to a potential BLM R.O.W. Grant No. R 01730 Historic District, and whether other such elements may also exist in the project area, including:

a. If the above resources share a historical association, a formal CRHR evaluation of the historic district;

b. A historical context for the historic district

Response: As stated in Applicant's May 29, 2008 letter, the Applicant objects to this data request as irrelevant and burdensome.

127. Please have a qualified architectural historian formally reassess the CRHR status of CA-SBR-10315H as both an element of the above historic district and as a individual historical resource, including:

a. The historical significance of the Boulder Dam-San Bernardino 115-kV transmission line;

b. A historical context for the Boulder Dam-San Bernardino 115-kV transmission line;

c. An assessment of all seven aspects of the line's integrity—location, design, materials, workmanship, setting, feeling, and association.

Response: As stated in Applicant's May 29, 2008 letter, the Applicant objects to this data request as irrelevant and burdensome.

128. Please have a qualified architectural historian assess impact of the proposed project's interconnection on the Boulder Dam-San Bernardino 115-kV line, and, on the potential BLM R.O.W. Grant No. R 01730 historic district, including:

a. A precise physical description of the proposed project's interconnection to the transmission line;

b. An assessment of the significance of the interconnection's impact on the Boulder Dam-San Bernardino 115-kV line relative to the portion of the that line extant in the project area;

c. A justification of the above recommendation;

d. Mitigation measures proposed to reduce any substantial adverse impact.

Response: As stated in Applicant's May 29, 2008 letter, the Applicant objects to this data request as irrelevant and burdensome.

129. Please provide the qualifications of the architectural historian addressing these data requests, indicating that he/she meets the Secretary of the Interior's Professional Standards for an Architectural Historian.

Response: As stated in Applicant's May 29, 2008 letter, the Applicant objects to this data request as irrelevant and burdensome.

Project Description (130-132)

BACKGROUND

Data Requests #1-3 asked for justification for requesting the 7,040 acre footprint in the BLM ROW applications when 3,400 acres were identified for plant construction and operations in the AFC. The requests also asked for identification of detailed construction, ground disturbance and reclamation measures on the other 3,640 acre footprint. Responses from the applicant did not answer the questions and asserted the lands could be utilized for unforeseen circumstances that may arise during licensing. This answer does not satisfy BLM. Only lands proposed for use by project facilities will be carried forward in the joint analysis. Other lands need to be dropped from the BLM ROW application.

DATA REQUEST

130. Provide an amended project description that addresses only those lands used for the footprint of the project.

Response: Please see Attachments DR130-1 and DR130-2.

131. Adjust all acreage calculations and legal land descriptions for the area required for the project.

Response: Please see Attachment DR130-1.

132. File an updated/amended SF-299 with the BLM Authorized Officer with updated legal descriptions.

Response: As stated in Applicant's May 29, 2008 letter, the Applicant understands that BLM has agreed to accept an updated Plan of Development instead of a revised SF 299. Please see Attachment DR130-1.

Attachment DR130-1

Revision 2

Ivanpah Solar Electric Generating System Plan of Development: Revised Project Description

Prepared for

Bureau of Land Management

Rev. 2, June 2008

CH2MHILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833

Contents

Section **Page**

Plan of Development: Revised Project Description

1.1 Introduction

Solar Partners I, LLC, Solar Partners II, LLC, Solar Partners IV, and Solar Partners VIII, LLC (the Applicant) propose to develop three solar thermal plants in close proximity in the Ivanpah basin. The three plants, collectively referred to as the Ivanpah Solar Electric Generating System (SEGS) would be located in southern California's Mojave Desert, near the Nevada border, to the west of Ivanpah Dry Lake. The project would be located in San Bernardino County, California, on federal land managed by the Bureau of Land Management (BLM). It would be constructed in three phases: two 100-megawatt (MW) phases (known as Ivanpah 1 and 2) and a 200-MW phase (Ivanpah 3) (see Figure 2).

On May 9, 2008 Applicant filed an optimized project design for the Ivanpah SEGS project in the form of Applicant's Data Response Set 1D. The optimized design provided Data Response Set 1D increased the land areas proposed for the Ivanpah SEGS project as a whole and also addressed certain areas of the project that would be utilized for temporary uses (e.g., the construction logistics area). This Plan of Development (POD) revision provides a revised project description as requested by BLM and CEC staff in Data Requests 130, 131, and 132 dated May 8, 2008.

Provided herein is a revised land description for Ivanpah SEGS 1, 2 and 3, the administration building and the Southern California Edison (SCE) substation and summaries of both temporary and permanent land disturbance.

1.2 Project Location and Jurisdiction

The proposed site is located in San Bernardino County 4.5 miles southwest of Primm, Nevada, 3.1 miles west of the California-Nevada border (see Figure 1). The site is located in Township 17N, Range14E, and Township 16N, Range 14E on land administered by BLM. The following tables 1 through 3 provide land descriptions including township/range, section numbers, and subdivisions for Ivanpah SEGS 1, 2 and 3, respectively. Table 4 provides land descriptions for the substation and the Ivanpah SEGS administration/warehouse building and the SCE substation.

TABLE 1
LAND DESCRIPTION FOR IVANAPH 1

Township/ Range	Section	Subdivision
16 North / 14 East	2	S.W.¼; S.½ N.W.¼; plus 500 feet on the south edge of the N.½ N.W.¼; plus 500 feet along the west side of the S.½ N.E. ¼; plus 500 feet on the west side of the S.E.¼
	3	S.W. ¼; S½ N.E.¼; E.½ S.W.¼; S.E.¼ N.W.¼; plus 500 feet on the south edge of the N. ½ N.E. ¼
	10	N.E.¼, E.½ N.W.¼
	11	N.W.¼

TABLE 2
LAND DESCRIPTION FOR IVANAPH 2

Township/ Range	Section	Subdivision
17 North / 14 East	28	S.½ S.E.¼; S. ½ S.E. ¼ S.W. ¼; plus 500 feet along the south edge of the N.½ S.E.¼
	27	S.½ S.W.¼; plus 500 feet along the south edge of the N. ½ S.W. ¼; plus 500 feet along the west edge of the W.½ S.E.¼
	33	N.E. ¼; S.E. ¼; E. ½ N.W. ¼; E. ½ S.W. ¼;
	34	W ½; 500 feet along the west side of the E. ½

TABLE 3
LAND DESCRIPTION FOR IVANAPH 3

Township/ Range	Section	Subdivision
17 North / 14 East	20	S.E.¼; S.½ N.E. ¼; S.½ N.½ N.E.¼; S.E.¼ N.W.¼; S.E.¼ N.E.¼; N.E.¼ S.W. ¼; N.½ N.½ S.E.¼ S.W.¼
	21	All
	22	500 feet along the west boundary of the section and 500 feet along the south edge of the S.W.¼ S.W.¼ S.W. ¼
	27	W.½ N.W.¼; S.W.¼
	28	N.W.¼; N.E.¼; N.½ S.E.¼; N.W.¼ S.W.¼ S.E.¼; N.½ S.W.¼; N.½ S.½ S.W.¼; N.½ S.E.¼ S.W.¼
	29	N.E.¼; N.½ S.E.¼; N.½ S.½ S.E.¼; E.½ S.E.¼ N.W.¼; E.½ N.E ¼ S.W.¼; N.E ¼ S.E ¼ S.W.¼

TABLE 4
LAND DESCRIPTION FOR OTHER AREAS

Township/ Range	Section	Subdivision
Substation		
17 North / 14 East	34	S.E ¼ S.W. ¼ S.W. ¼; S.W.¼ S.W.¼ S.E.¼ S.W.¼;
16 North / 14 East	3	N.W. ¼ N.E. ¼ N.W. ¼; N.W. ¼ N.W. ¼; N.W. ¼ S.W. ¼ N.W. ¼;
	4	S.E.¼ N.E.¼ N.E.¼; N.E.¼ S.E.¼ N.E.¼; E.½ S.E.¼ N.E.¼; N.½ S.E.¼ S.E.¼ N.E.¼
Administration/Warehouse Building		
16 North / 14 East	3	W.½ N.W.¼ N.E.¼

Table 5 provides a summary of land areas that will permanently disturbed (i.e., during the operational life of the facility). Table 6 provides a summary of land areas that will be temporarily disturbed during construction of the project.

TABLE 5
AREAS OF PERMANENT DISTURBANCE

FACILITY DESCRIPTION	ACRES
Ivanpah 3	1,843.15
Ivanpah 2	920.74
Ivanpah 1	913.50
Administration / Warehouse & Parking	5.71
Substation B	26.64
Transmission Towers	0.003
Wells	0.01
Detention Pond D, E and Diversion Channel	28.69
Kern River Gas Line Tap Station	0.17
FACILITY SUBTOTAL	**3,738.60**

LINEAR DESCRIPTION	LENGTH (in feet)	ACRES
Colosseum Road Improvement 30' Wide (Asphalt)	10,111	6.96
Colosseum Road Realignment	6,706	4.62
Gas Line 12' Permanent Disturbance	2,011	0.55
Gas Line 12' Corridor between Ivanpah 1 & 2[a]	--	--
Water Line - 12' Permanent Disturbance	1,393	0.38
12' Access Road to Monitoring Well	830	0.23
Transmission Line - 12' Permanent Dirt Access Rd	4,539	1.25
12' Trail Around Ivanpah 3 -- Rerouted[b]	--	--
12' Trail to Access Mining Claim -- New	1,492	0.41
LINEAR SUBTOTAL		**14.41**
TOTAL AREA OF PERMANENT DISTURBANCE		**3,753.01**
Construction Logistics Area[c]		81.52

NOTES:
[a] Gas line will be located under the paved road
[b] Area for this trail is included in the Ivanpah 3 area
[c] This is the area to the northeast of Substation A and to the east of the existing transmission line corridor. It could be considered a permanent impact because it will be in temporary use for 4+ years.

TABLE 6
AREAS OF TEMPORARY DISTURBANCE

LINEAR DESCRIPTION	LENGTH (in feet)	ACRES
Gas Line 75' Construction Disturbance from tap to Ivanpah 3	2,011	2.91
Gas Line corridor between Ivanpah 1 & 2	--	--
Kern River Gas Line Tap Construction Area (200' x 200')	--	0.92
Southwest Gas Construction Laydown	--	1.37
Water Line - 50' Construction Disturbance	1,393	1.22
Substation Construction Laydown		26.64
TOTAL TEMPORARY DISTURBANCE AREA (TO BE REVEGETATED)		**33.04**
Construction Logistics Area Northwest of Substations A & B[b]		97.96

NOTES:
[a] Included in the construction of the asphalt road.
[b] Assumed no impact to this area because impacts will be small, if at all.

ATTACHMENT DR130-2

BRIGHTSOURCE ENERGY

IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

PLAN OF DEVELOPMENT CIVIL ENGINEERING DESIGN PACKAGE

ISSUED BY

WORLEYPARSONS

IVAN-DB-024-0001

REVISION 0

June 5, 2008

TABLE OF CONTENTS

1.0 PROJECT DESCRIPTION

1.1 Project Overview

The Ivanpah Solar Electric Generating System (Ivanpah SEGS) is a three-facility, solar thermal electric generating facility to be located two miles west of the Ivanpah Dry Lake and southwest of Primm, Nevada in San Bernardino County, California. The project site is to be located on federal land managed by the Bureau of Land Management (BLM). The total station net rating is to be approximately 400 Megawatt (MW) consisting of Ivanpah 1 (nominal 100 MW), 100 MW Ivanpah 2 (nominal 100 MW) and Ivanpah 3 (nominal 200 MW) (See Figure 1). Currently the planned sequence of construction is to initially construct Ivanpah 1 (southernmost facility) and the shared infrastructure needed to support all facilities (adjacent Substation and Administration/Storage buildings). Ivanpah 2 (center facility) will be constructed next, followed by Ivanpah 3 (northernmost facility), although the order of construction is subject to change. Both Ivanpah 1 and 2 will each require approximately 920 acres for construction (1.43 square miles each), while Ivanpah 3 is to be substantially larger, requiring approximately 1,894 acres (3.0 square miles). The fenced areas for Ivanpah 1, 2, and 3 total 3592 acres. The area between Ivanpah 1 and 2 of approximately 377 acres will be used extensively during construction, but during operations will include the SCE substation, a Southwest Gas metering station, and shared facilities (administration/storage building, wells, and linear facilities).

2.0 PROJECT ARRANGEMENT

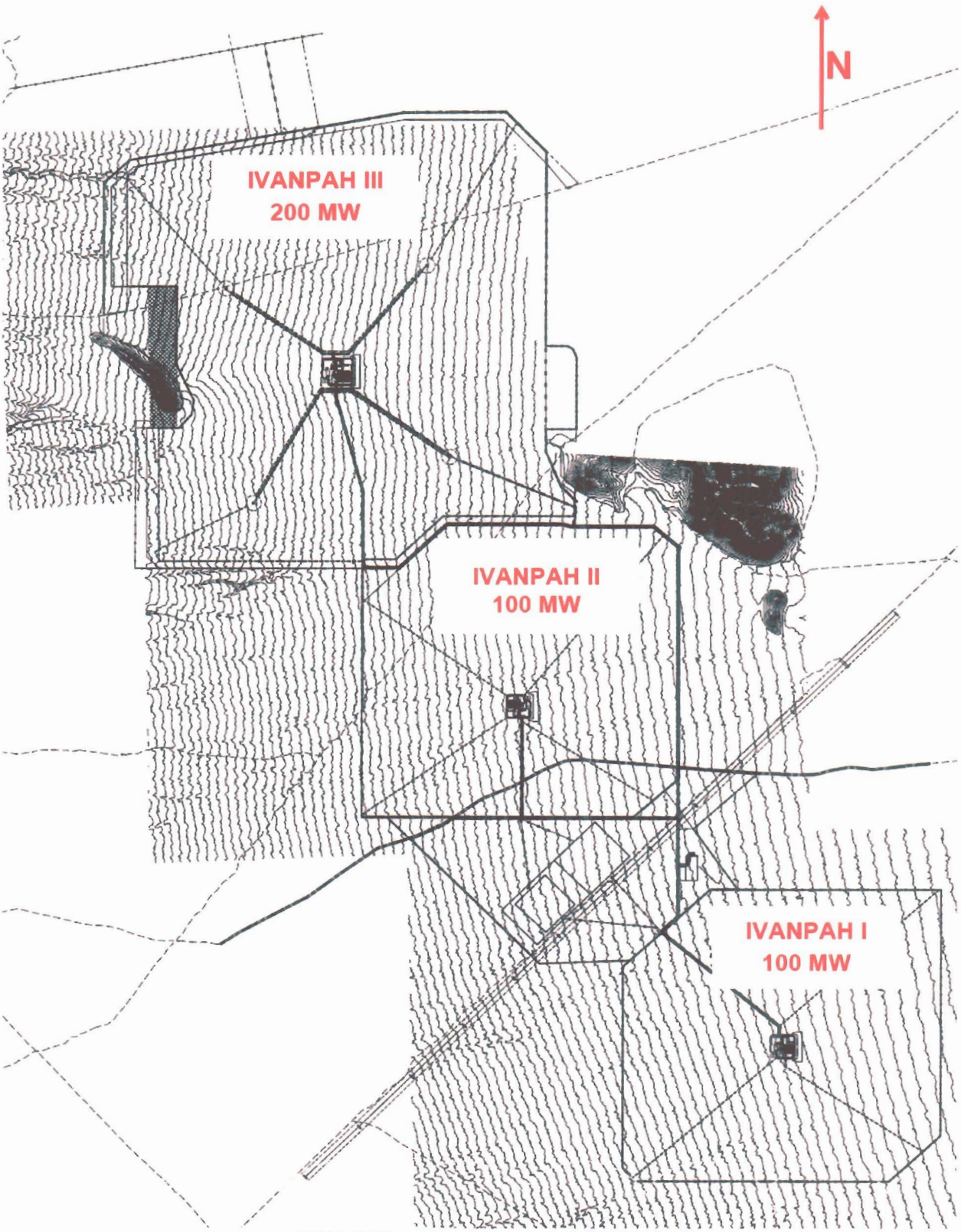
2.1 Introduction

This section establishes the plan of development and layout of the site's ponds, culverts, diversion channels, roadways, and erosion and sedimentation controls.

2.2 Site Arrangement

A. Site Project Base Map and Coordinates

Survey Area (Project Site Coordinates), transmission line, public and private trails/roads and well coordinates have been provided by CH2M Hill and verified by CH2M Hill and BrightSource Energy, Inc. (BSEI). All coordinates were provided in the North American Datum of 1983 (NAD 83) coordinate system (See Figure 2). The power blocks and associated heliostat arrangements were provided by BSEI.



IVANPAH SEGS UNITS 1-3

FIGURE 1

B. Facility Arrangement

The arrangement of equipment in each area of the facility was developed by the Ivanpah SEGS team consisting of BrightSource Energy, CH2M Hill, Sierra Research and WorleyParsons. The Plan of Development Civil Engineering Design Drawings of the Ivanpah SEGS are as follows:

IVAN-0-DW-048-111-001, Plan of Development Site General Arrangement Plan
IVAN-1-DW-024-112-002, Ivanpah 1 Plan of Development Drainage Plan
IVAN-2-DW-024-112-003, Ivanpah 2 Plan of Development Drainage Plan
IVAN-3-DW-024-112-004, Ivanpah 3 Plan of Development Drainage Plan
IVAN-1-DW-024-112-005, Ivanpah 1 Plan of Development Grading Plan
IVAN-2-DW-024-112-006, Ivanpah 2 Plan of Development Grading Plan
IVAN-3-DW-024-112-007, Ivanpah 3 Plan of Development Grading Plan

New equipment and features shown on drawings not shown on previous submittals are as follows:

- New Receiver Tower and Power Tower locations
- Power Towers for Ivanpah 1 and 2
- Updated Arrays fields for Ivanpah 1 and 2
- Updated road arrangement for each facility
- Approximate utility locations
- Additional surveyed area

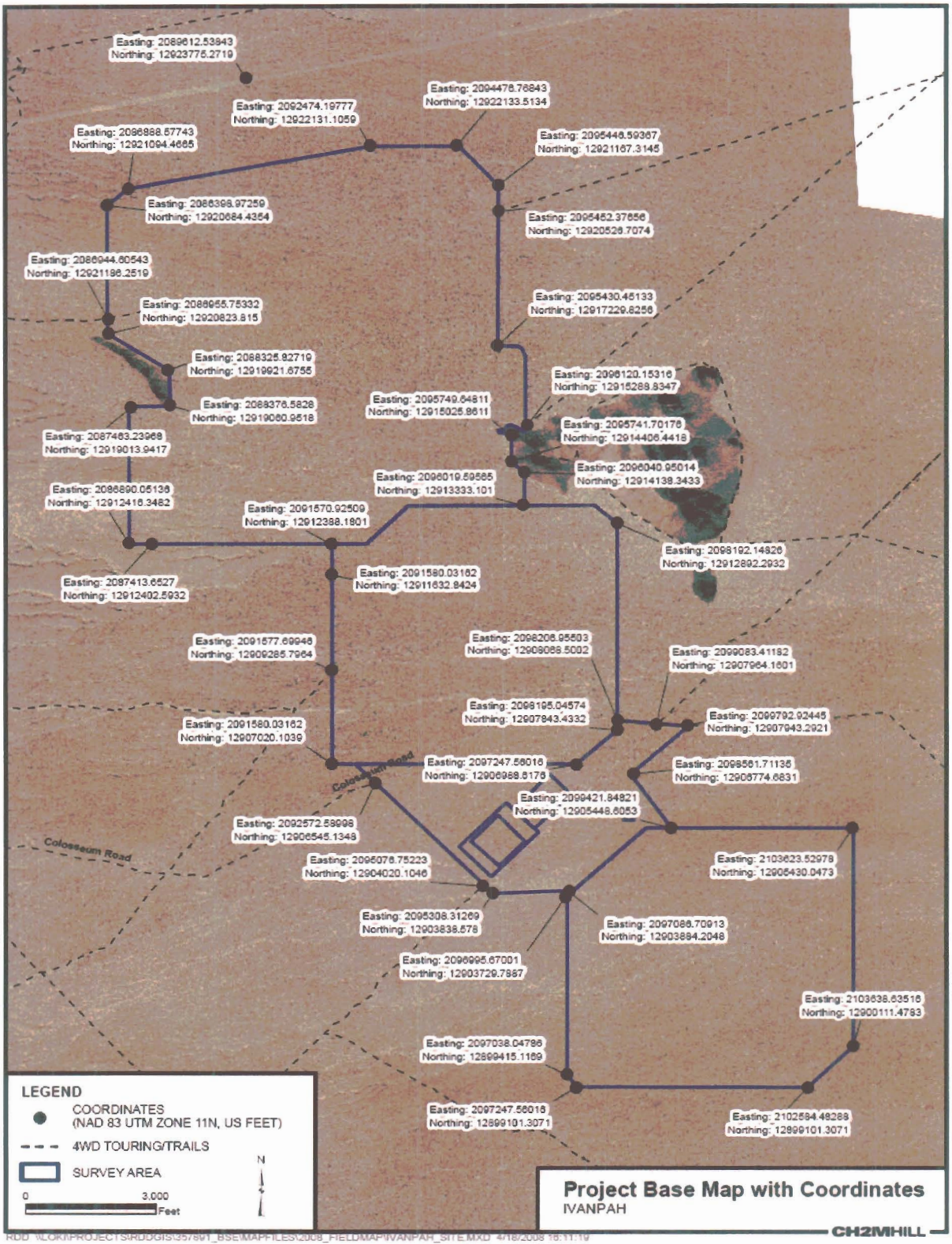

Easting: 2089612.53943
Northing: 12923775.2719
Easting: 2092474.19777
Northing: 12922131.1059
Easting: 2094478.76843
Northing: 12922133.5134
Easting: 2086888.67743
Northing: 12921094.4665
Easting: 2095446.59367
Northing: 12921167.3145
Easting: 2086398.97259
Northing: 12920684.4354
Easting: 2095452.37656
Northing: 12920528.7074
Easting: 2086944.60543
Northing: 12921186.2519
Easting: 2086955.75332
Northing: 12920823.815
Easting: 2095430.45133
Northing: 12917229.6256
Easting: 2088325.82719
Northing: 12919921.6755
Easting: 2096120.15316
Northing: 12915289.8347
Easting: 2088376.5828
Northing: 12919060.9518
Easting: 2095749.64811
Northing: 12915025.9611
Easting: 2095741.70176
Northing: 12914406.4418
Easting: 2087483.23968
Northing: 12919013.9417
Easting: 2096040.95014
Northing: 12914138.3433
Easting: 2086890.05136
Northing: 12912416.3482
Easting: 2096019.59585
Northing: 12913333.101
Easting: 2091570.92509
Northing: 12912388.1801
Easting: 2098192.14926
Northing: 12912892.2932
Easting: 2087413.6527
Northing: 12912402.5932
Easting: 2091580.03162
Northing: 12911632.8424
Easting: 2091577.69946
Northing: 12909285.7964
Easting: 2098208.95503
Northing: 12909088.5002
Easting: 2099083.41182
Northing: 12907964.1601
Easting: 2098195.04574
Northing: 12907843.4332
Easting: 2099792.92445
Northing: 12907943.2921
Easting: 2091580.03162
Northing: 12907020.1039
Easting: 2097247.56016
Northing: 12906988.5176
Easting: 2098561.71136
Northing: 12906774.6831
Colosseum Road
Easting: 2099421.84821
Northing: 12905448.6053
Easting: 2092572.59998
Northing: 12906545.1348
Colosseum Road
Easting: 2095076.75223
Northing: 12904020.1046
Easting: 2103623.52978
Northing: 12905430.0473
Easting: 2095308.31269
Northing: 12903838.578
Easting: 2097086.70913
Northing: 12903884.2048
Easting: 2096995.67001
Northing: 12903729.7887
Easting: 2103638.63516
Northing: 12900111.4783
Easting: 2097038.04786
Northing: 12899415.1169
Easting: 2097247.56016
Northing: 12899101.3071
Easting: 2102584.48288
Northing: 12899101.3071
LEGEND
COORDINATES
(NAD 83 UTM ZONE 11N, US FEET)
4WD TOURING/TRAILS
SURVEY AREA
0
3,000
Feet
N
Project Base Map with Coordinates
IVANPAH
CH2MHILL

FIGURE 2

3.0 PURPOSE

It is the intent of this section to detail the site specific requirements and design parameters utilized in the development of engineering solutions to the major site development issues encountered for the Ivanpah SEGS Project. Items to be discussed include: clearing, grubbing, grading, hydrology, drainage, detention and by-passing, staged release, erosion and sediment controls, and site stabilization. This document contains the technical and functional requirements (including the applicable regulatory requirements, design bases, and other industry and quality standards) to which the Ivanpah SEGS Project is to be designed. These functional and technical requirements include BrightSource Energy's requirements and are applicable to the overall project.

3.1 Codes and Standards

The following Codes and Standards apply to the civil engineering and design work performed on the Ivanpah SEGS Project. Unless noted otherwise, the latest edition and published addenda shall apply.

In the event of any conflicts between codes, or between specifications and codes, the more stringent regulation is to apply.

A. California Stormwater BMP Construction Handbook for New Development and Redevelopment, January 2003.

B. State of California Department of Transportation (CALTRANS) Standard Specification

C. San Bernardino County Hydrology Manual, 1986

D. Geotechnical Engineering Report of Solar Power Plant, Ivanpah Valley, San Bernardino County, California by Terracon Consultants, Inc. Dated July 11, 2007.

E. The Effect of Roads, Barrier Fences and Culverts on Desert Tortoise Populations in California, USA, New York Turtle and Tortoise Society, 1997.

3.2 References

Williamson and Schmid, Civil Engineers, San Bernardino County Hydrology Manual, Irvine, CA, 1986.

San Bernardino County Stormwater Program, Model Water Quality Management Plan Guidance, revised June 9, 2005.

"Global Mapper" Global Mapper Software, LLC, Olathe, KS.

"NOAA" National Weather Service, Silver Spring, MD.

"Pond Pack" Version 8.0, Haestad Methods Inc., Waterbury, CT.

"Storm CAD" Bentley Systems, Inc., Exton, PA.

"Flow Master" Bentley Systems, Inc., Exton, PA.

3.3 Site Development

A. Geotechnical

All geotechnical information is outlined in the Geotechnical Engineering Report for Solar Power Plant, Ivanpah Valley; San Bernardino County, California by Terracon Consultants, Inc. dated July 11, 2007. Additional Geotechnical work will be performed once the site enters the design phase (See Appendix A).

B. Natural Vegetation

The site's natural vegetation is to remain in place and undisturbed in each facility between every other heliostat row where land disturbing activities are not required for access of installation equipment and materials. See Drawings IVAN-1-DW-024-112-005, IVAN-2-DW-024-112-006 and IVAN-3-DW-024-112-007 for areas where natural vegetation is to remain.

C. Clearing

Clearing the site of vegetation is to be performed in areas where the existing terrain will permit access of installation equipment and materials throughout the site during construction (without the need of leveling or grading). Vegetation is to be cut at the ground leaving the root structures intact. See Drawings IVAN-1-DW-024-112-005, IVAN-2-DW-024-112-006 and IVAN-3-DW-024-112-007 for areas specified for clearing to minor leveling.

D. Clearing and Grubbing

Clearing and grubbing (roots to be removed) of the site is to be performed as required for each facility and in common areas where the existing topography requires modification in order to provide access for installation equipment and materials during construction (areas requiring leveling or grading). Where existing site topography is favorable the natural drainage features will be maintained. See Drawings IVAN-1-DW-024-112-005, IVAN-2-DW-024-112-006 and IVAN-3-DW-024-112-007.

E. General Grading and Leveling:

1. Facility Grading and Leveling

a. The Ivanpah SEGS Project is to be a balanced site regarding cuts and fills. Site grading will be designed to maintain all local materials onsite and without the import of offsite material. The import of suitable stone aggregate may be required if not available on site.

b. The grade of each facility is to be designed to provide the minimum access required for the access of installation equipment and materials during site construction and operations. Natural drainage features are to be maintained where practical and grading is to be designed to promote sheet flow where possible.

c. Grading is to be performed between every other row within heliostat array fields where vehicle access is required for equipment installation and maintenance. In addition grading is to be performed within the sites diversion channels, pond areas, receiver towers, power block areas, power block connecting roads, power block to receiver tower connecting roads, the re-routed Colosseum Road, and the relocated mining claim dirt access road. In addition, all onsite building and associated parking areas are to be graded.

d. Grade is to be designed to provide positive drainage of rainfall runoff away from each structure. In general, grade shall be sloped away from the building walls and equipment at a minimum pitch of two percent (2.0%) to provide surface drainage.

e. Leveling (cuts and fills) is to be conducted within the heliostat array fields at the locations where large stormwater swales (ephemeral washes) require traversing by heliostat installation and maintenance vehicles.

f. Drawings IVAN-1-DW-024-112-005, IVAN-2-DW-024-112-006 and IVAN-3-DW-024-112-007 have been created to provide additional clarity regarding typical areas of disturbance within the heliostat array fields.

F. Excavations

1. Slopes

a. Embankments and excavated areas shall have the following slopes:

i. Permanent embankments and excavations: 1 Vertical to 3 Horizontal or flatter.

ii. Temporary embankments and excavations: Follow OSHA requirements.

2. Temporary Slope Protection

   a. Slopes of excavated areas shall be protected from rutting and scouring by means armoring with local stone. Surface water is not to be permitted to flow uncontrolled down any embankment slope.

   b. Where grade surface is flat or rises from the edge of an excavation, the top of the excavated slope is to be protected by a low berm which is to be continuous and extend to a point at each end where the grade has a positive slope away from the excavation. The discharge from such protective system should be led to the edge of the excavation in order to prevent edge and slope scour.

   c. Where job conditions require the temporary use of excavated slopes steeper than listed above, the cutting of such slopes and protective means are to be employed to maintain the stability of the slopes in accordance with OSHA Part 1926, Subpart P.

   d. Slopes of embankments are to be protected against rutting and scouring during construction in a manner similar to that required for excavated slopes.

3. Disposition of Excavated Materials

   a. Reusable local materials are to be hauled to lay-down areas for reuse or placed directly in the fill or backfill locations. A stone crusher facility may be utilized onsite for the production of sub-grade materials (gravel) from local stone. Stockpiles of local materials shall be neatly shaped and free to drain.

   b. Material which does not meet the requirements for fill, backfill, or sub-grade shall be disposed of onsite in locations designated by BrightSource Energy.

4. Requirements for Fill and Backfill

   a. Fill and backfill material are to be compacted to 95 percent of the Modified Proctor maximum dry density and structural fill shall be compacted to 100 percent of the Modified Proctor maximum dry density.

G. Hydrology

1. Hydrology calculations are to be performed using TR-55 (SCS Method) to determine the amount of pre and post development stormwater run-on and run-off for each basin or sub-basin within each facility.

2. The San Bernardino County Hydrology manual will be used to classify soil characteristics, expected soil types and other design criteria necessary for use with the TR-55 calculations. Offsite flows are to be determined using the western watershed boundaries from available state watershed information, contour intervals, and available soils mapping information. Watersheds are to be further broken down into sub-basins as required to determine the western flow from the ephemeral washes as they approach the Ivanpah project areas to be developed. This process is necessary to determine the offsite flow required to design the bypass channels, detention ponds and roadway culverts through the developed Ivanpah Project site. Channels are to be designed using Bentley Flow Master to determine flow rates, cross sections, acceptable velocities and materials necessary to prevent scouring.

3. Storm Drainage System

    a. The storm drainage system is to be designed as a system of diversions channels, detention ponds, by-pass channels, swales and ephemeral washes (new and existing) to direct the flow of off site (run-on) and onsite stormwater (run-off) through and around each facility prior to discharge onto the adjacent downstream properties as sheet flow for all storm events less than or equal to a 100 yr, 24 hr storm event. Natural drainage features are to remain intact where practical.

    b. The stormwater drainage system is to be designed by using the Soil Conservation Service (SCS) method (TR-55) by determining the amount of rainfall during a specific rainfall storm event. This method is in accordance with requirements specified in the most current version of San Bernardino County Hydrology Manual.

    c. All surface runoff during and after construction is to be controlled in accordance with the requirements of the National Pollutant Discharge Elimination System (NPDES) Construction Runoff Permit, the requirements of the San Bernardino Water Quality Management Plan manual, and all other applicable laws, ordinances, regulations and standards.

    d. Culverts and diversion channels are to be designed so that a minimum ground surface slope of 0.5% shall be provided to provide positive, puddle-free drainage.

e. Storm drainage channels may be lined with a non-erodible material such as compacted Rip Rap, geo-synthetic matting or engineered vegetation to reduce erosion.

f. Pipe culverts are to be used where drainage channels cross roads. Culverts are to be reinforced concrete, corrugated metal pipe (CMP) or smooth-lined polyethylene (SLPE) pipe.

4. Power Block Drainage

a. The power block is to be elevated at least 1.5 feet above surrounding roadway. Stormwater run-on to the power block area, including run-off from the power block itself, is to be collected in a system of swales and ditches that discharge to an adjacent detention pond.

5. Detention and By-pass

a. The Ivanpah SEGS detention ponds are to be placed upstream in each facility drainage area to detain and release an equivalent volume of concentrated off site stormwater run-on to the volume required for conventional on-site stormwater detention and runoff. Stormwater falling onto the site will be directed through as system of stone filters and check dams (for erosion control) prior to off site release as sheet flow. An exception to this will be the power block and substation/administration areas which will have their own detention facilities. This concept will have the advantage of controlling the run-on from large ephemeral washes prior to the release of stormwater through bypass channels or across the site as sheet flow. This method is intended to protect on-site soils and equipment by controlling the velocity and direction of stormwater prior to reaching the heliostat fields.

b. Each diversion channel and detention pond is to be sized using the design requirements dictated in the San Bernardino County Hydrology Manual. Each detention pond will be designed using output from Haestad's Pond Pack computer program. Likewise, these output flows are to be used to determine the approximate amount of stormwater entering the diversion channel, either from the detention pond or from offsite run-on.

c. Ivanpah 1, 2,and 3 are to be divided into sub–basins and each sub-basin will be designed to have a detention pond sized to detain a volume of stormwater equivalent to the difference between pre and post development runoff from the 100-year 24-hour storm event as prescribed in the San Bernardino County Hydrology Manual.

d. Sub-basin detention ponds located along each facility's western boundary are to be designed to collect stormwater as both sheet flow and run-on from ephemeral washes discharging onto the site from the undeveloped western watersheds (See Figure 3). Detained stormwater is to be released back on-site through a controlled outlet structure and diversion channel for dispersal as sheet flow. Excess stormwater from the detention ponds (additional stormwater volumes greater than the required detention volume) is to over flow the detention pond as sheet flow through an armored weir spanning the length of the detention pond. In addition, the stormwater run-on from large ephemeral washes, in excess of the volume required for detention, may by-pass the pond system through a series of diversion channels prior to dispersal across the site as sheet flow.

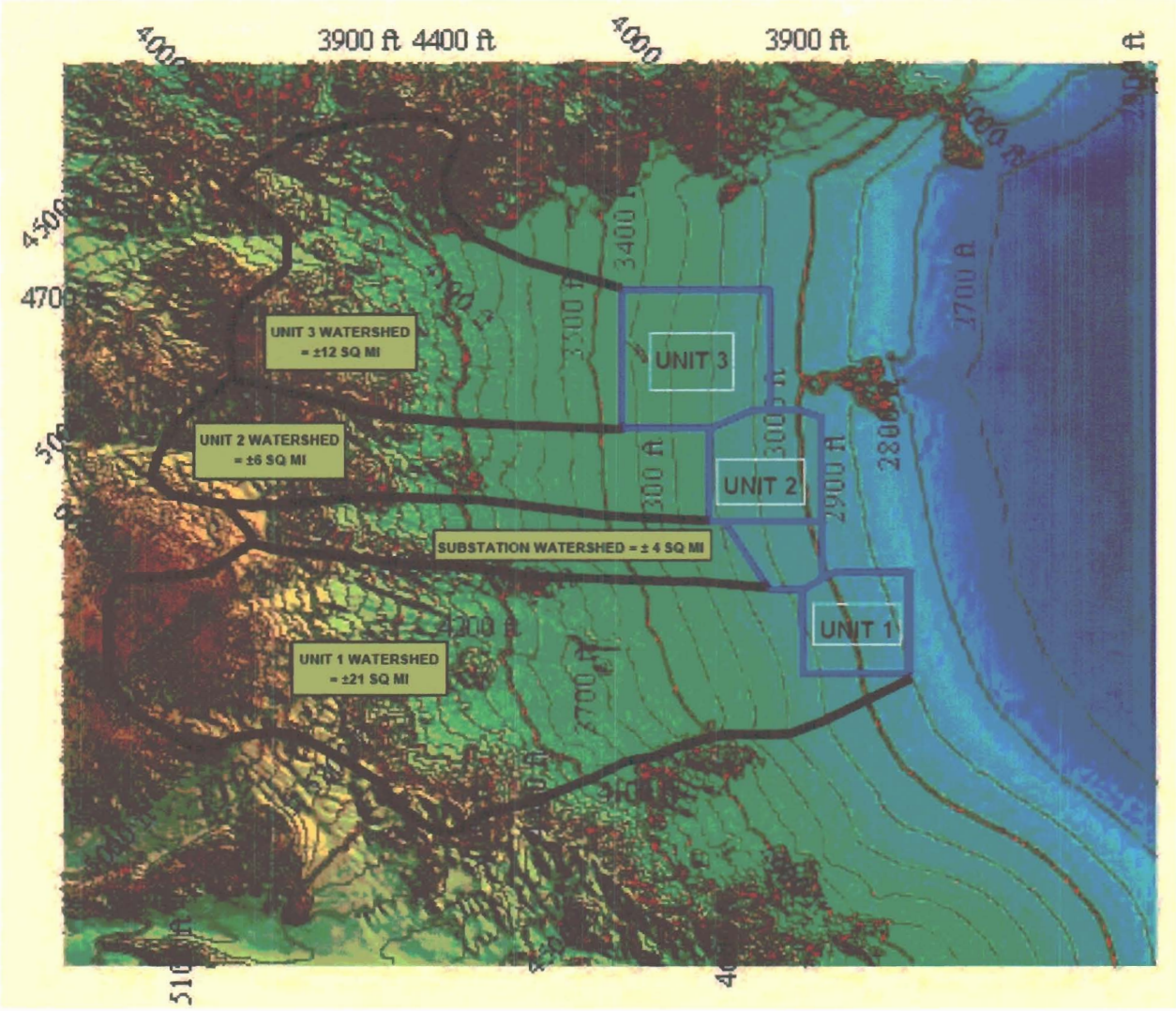


FIGURE 3

e. Detention pond weirs are to be used to distribute surplus western flow across the facility as sheet flow. Native stone Rip Rap (if available) is to be placed across the length of the weir and down the spillway of the detention pond to control velocities and prevent scouring.

f. Each detention pond will be cleaned of sediment as required and bottom grades shall be reestablished as originally designed. Each pond is to be provided with a cleanout elevation rod that indicates when sediment is to be removed. All sediment is to be disposed of onsite.

g. By-pass channels within the project site are to be sized to redirect excess off-site stormwater (above that required for detention) up to the 100-year 24-hr storm event. Bypassing will be either around the site (as shown north of Ivanpah 3 and between Ivanpah 2 and 3) or through the facility (as in Ivanpah 1 and 2). See drawings IVAN-1-DW-024-112-005, IVAN-2-DW-024-112-006 and IVAN-3-DW-024-112-007.

h. Staged release – The Ivanpah 3 northwestern and southwestern diversion channels may be designed (if required) with a flow-by intercept weir downstream of the detention pond to disperse stormwater back through out the eastern heliostat fields. In addition, a controlled outlet structure may be placed in the diversion channels to disperse controlled amounts of stormwater back into the heliostat field as sheet flow to prevent concentrating flows in a single outfall area.

6. Facility Detention Ponds

a. Ivanpah 1

The Ivanpah 1 detention pond A is to collect stormwater from the undeveloped western watershed. The excess stormwater will either be released into sub-basin A and B as sheet flow, released into a bypass channel or a combination of the two (See Figure 4). Pond A is to be sized to detain the volume of water equivalent to the difference between sub-basins A's post-developed (approximately 820 CFS) and pre-developed (approximately 493 CFS) stormwater volumes which discharge along the sub-basin's eastern property boundary.

Pond B is to collect stormwater from the undeveloped western watershed, stormwater from sub-basin B's post development and surface runoff from the Ivanpah 1 power block.

Surface runoff is to be conveyed by a system of swales and channels around power block area into detention pond B (See Figure 4). Pond B is to be sized to detain the volume of water equivalent to the difference between sub-basins B's post-developed (approximately 210 CFS) and pre-developed (approximately 123 CFS) stormwater volume.

The stormwater from Pond B will sheet flow back into sub-basin B prior to discharging along the eastern sub-basin boundary.

Pond C is to collect stormwater from the pre-developed western watershed. The increase in stormwater runoff will either be released into sub-basin C as sheet flow, released

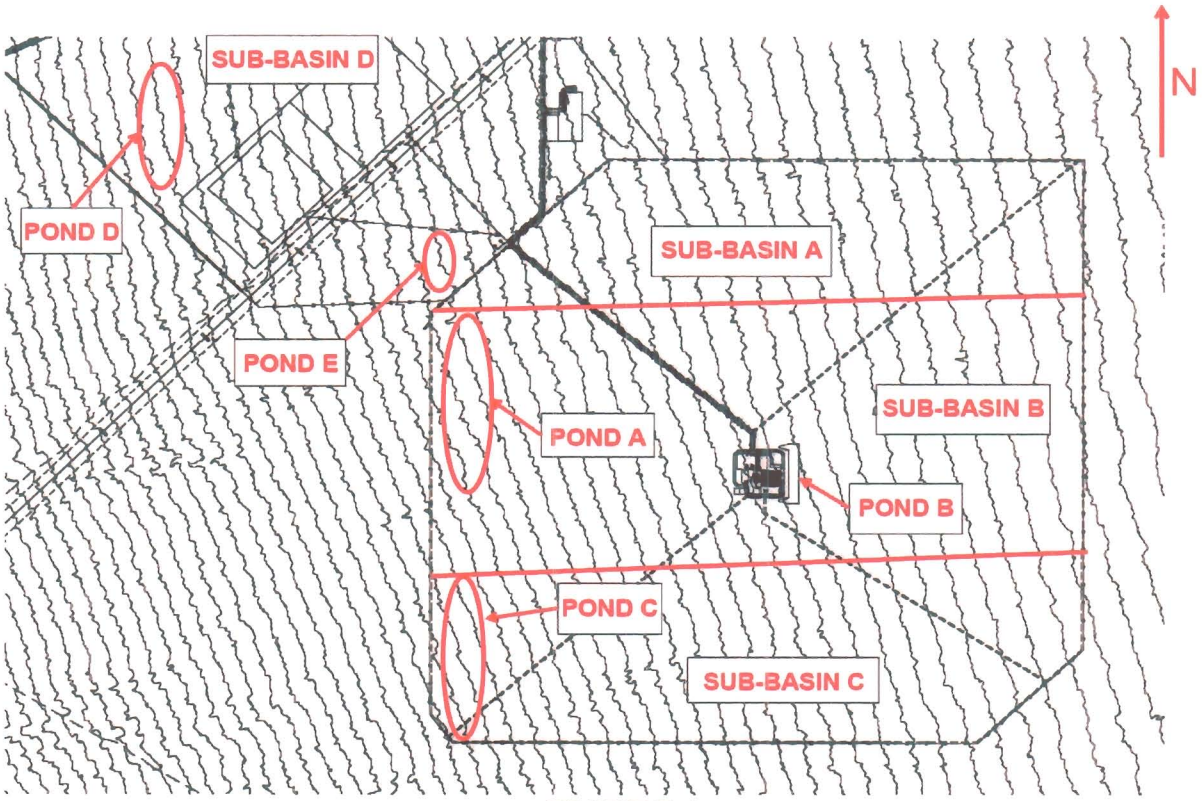


FIGURE 4

into a bypass channel or a combination of the two (See Figure 4). Pond C is to be sized to detain the volume of water equivalent to the difference between sub-basins A's post-developed (approximately 415 CFS) and pre-developed (approximately 245 CFS) stormwater volume which discharges along the eastern sub-basin boundary.

b. Sub-station and Administration Area

Pond D and E are to collect stormwater from the undeveloped western watershed and sub-basin D post-development area. Both ponds are to be sized to detain a volume of water equivalent to the difference between sub-basin D's post-developed (approximately 720 CFS) and pre-developed (approximately 440 CFS) stormwater volumes. Stormwater from ponds D and E are to sheet flow into sub-basin D prior to the discharging along the eastern sub-basin boundary (See Figure 5).

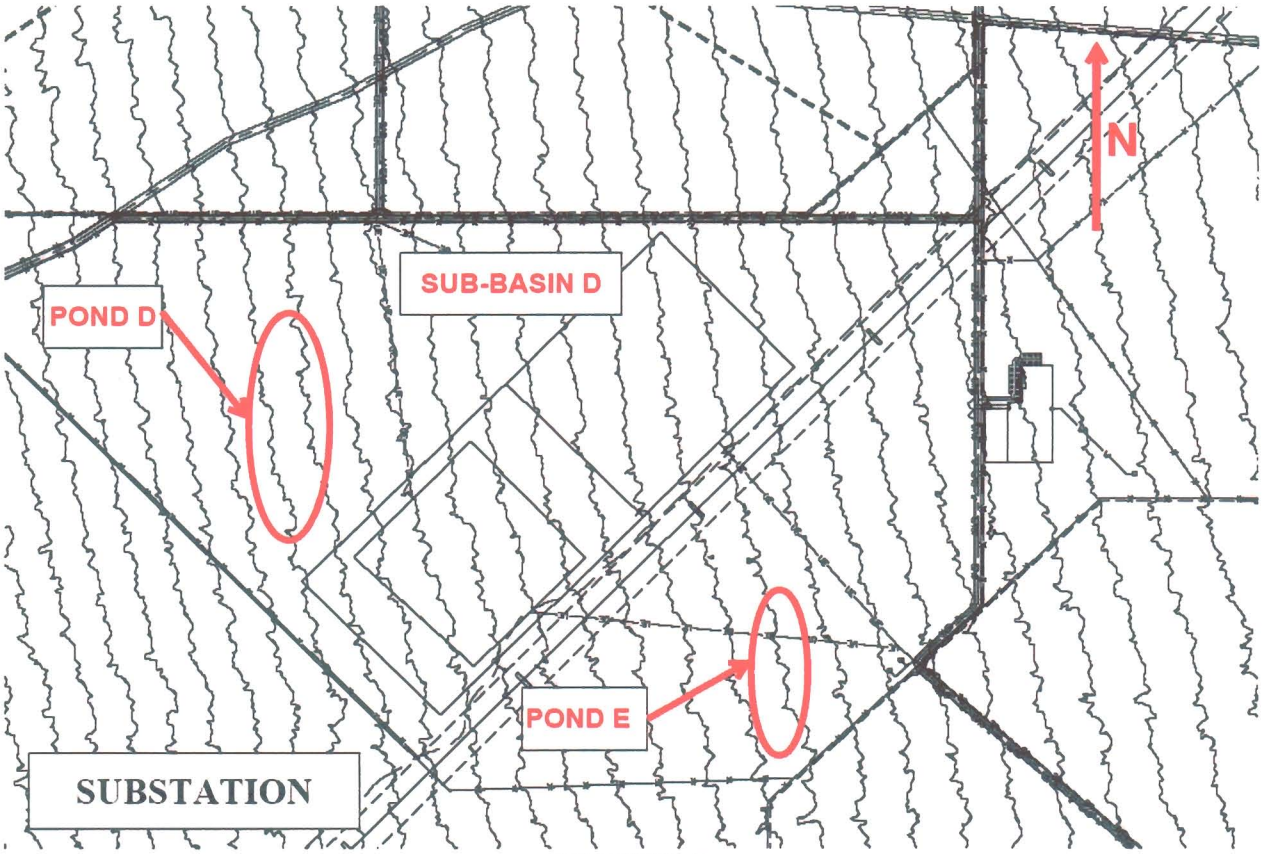


FIGURE 5

c. Ivanpah 2

Ponds F and H are to collect stormwater from the undeveloped western watershed and divert the stormwater into a bypass channel directed north of the Ivanpah 2 power block. Ponds F and H are to be sized to detain a volume of water equivalent to the difference between sub-basins F and H's developed (approximately 517 CFS and 415 CFS, respectively) and pre-developed (approximately 311 CFS and 517 CFS, respectively) stormwater volumes. The stormwater from Ponds F and H is to be sheet flow back into sub-basin F and H prior to discharging to the eastern site boundary.

All excess stormwater brought onto the site from the western watershed will either be released into sub-basin F and H as sheet flow, released into a bypass channel or a combination of the two (See Figure 6).

Pond G is to collect stormwater from the undeveloped western watershed, stormwater from sub-basin G's post development and surface runoff from the Ivanpah 2 power block. Surface runoff is to be conveyed by a system of swales, channels, or trenches around power block area into detention Pond G.

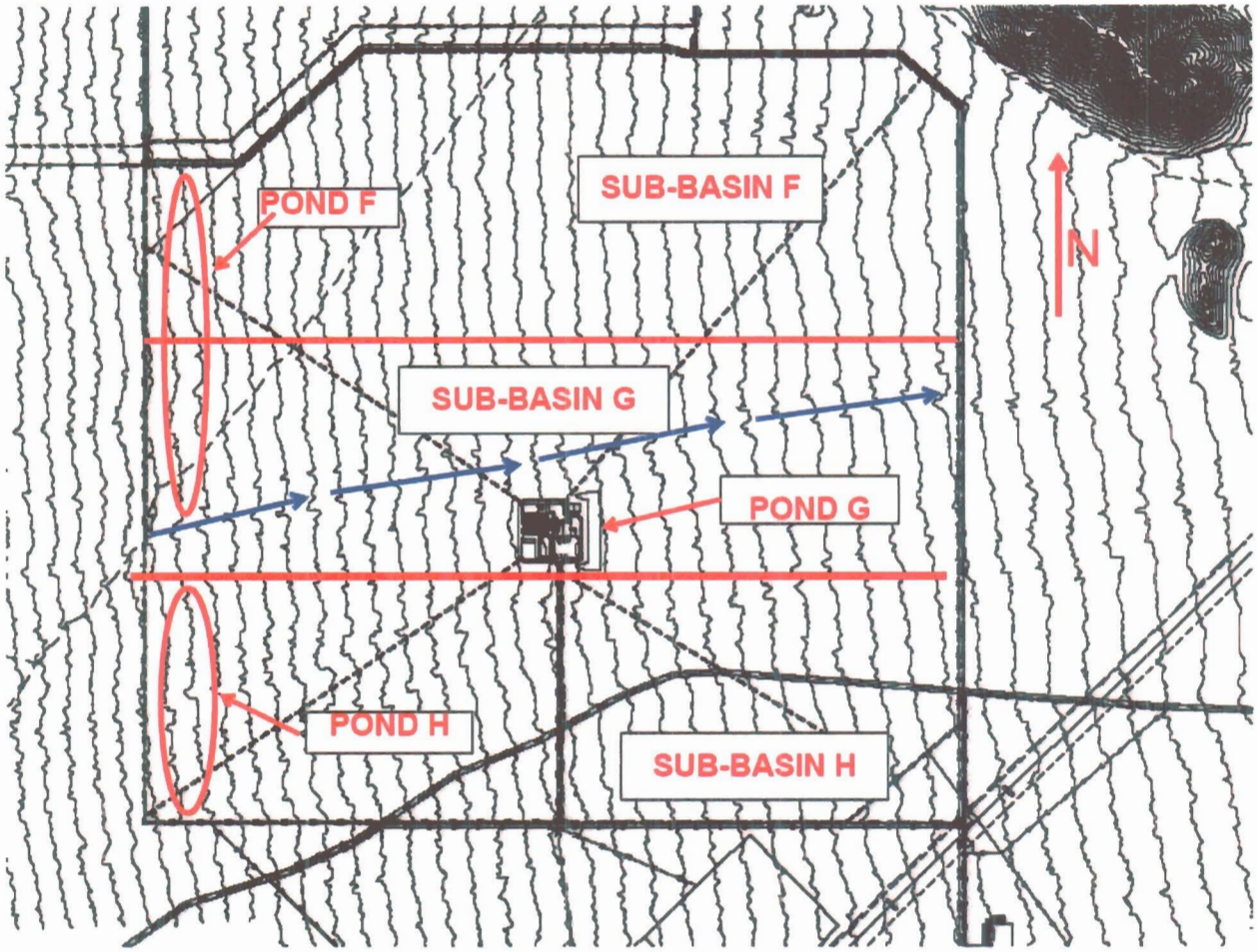


FIGURE 6

Pond G is to be sized to detain a volume of water equivalent to the difference between sub-basins G's developed (approximately 311 CFS) and pre-developed (approximately 517 CFS) stormwater volumes. The stormwater from Pond G will sheet flow back into sub-basin G, prior to discharging along the sub-basin's eastern boundary (See Figure 6 above).

d. Ivanpah 3

Pond I is to collect stormwater from the undeveloped western watershed. The excess stormwater will either be released into sub-basin I as sheet flow, released into a bypass channel or a combination of the two (See Figure 7). Pond I is to be sized to detain a volume of water equivalent to the difference between sub-basins I's developed (approximately 925 CFS) and pre-developed (approximately 560 CFS) stormwater volumes which discharges along the eastern sub-basin boundary.

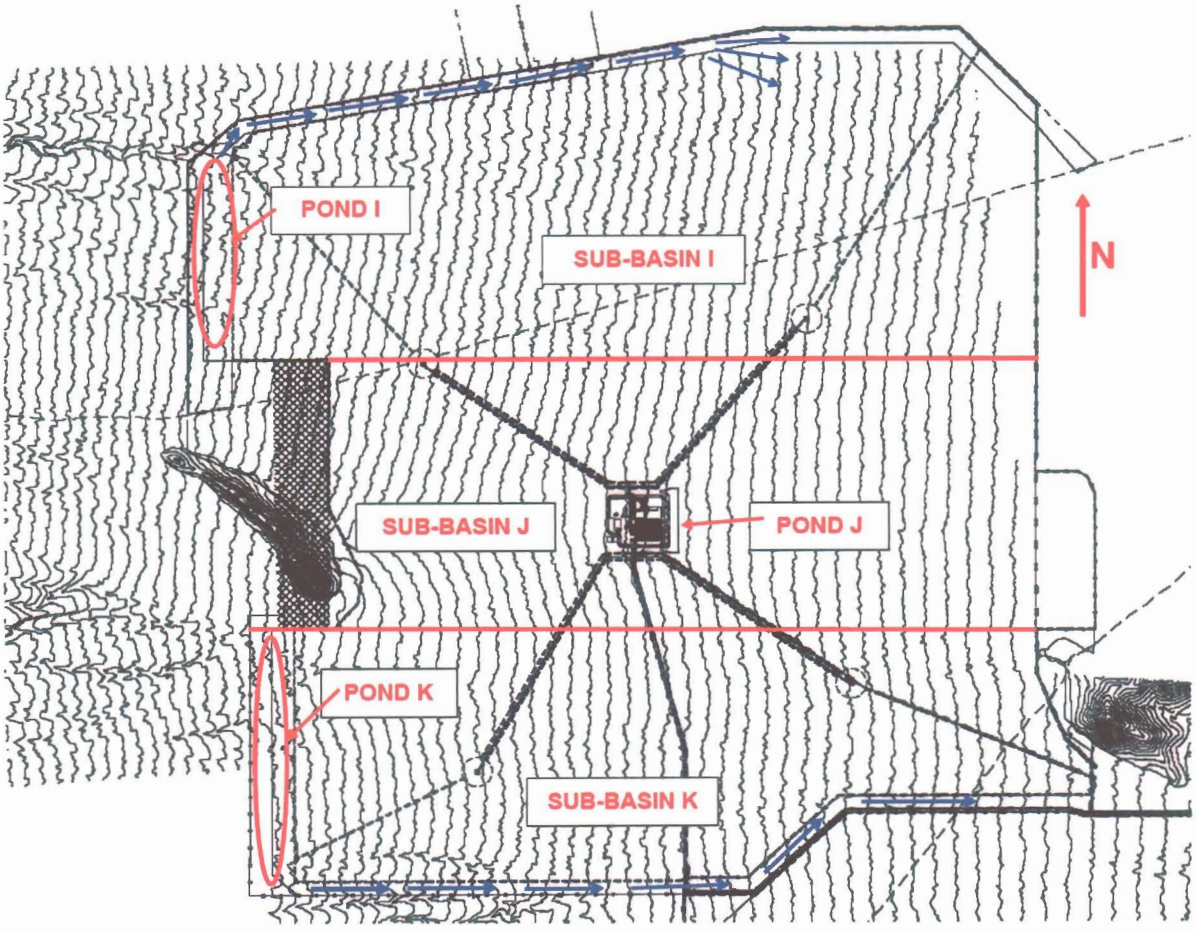
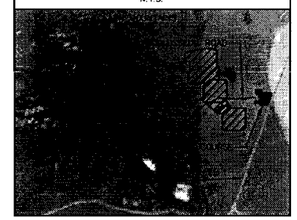


FIGURE 7

SHEET INDEX

NORTH

VICINITY MAP
N.T.S.



EXISTING 287 KV LADWP LINES
KERN RIVER GAS TAPPING STATION
EXISTING KERN RIVER GAS LINE
CONSTRUCTION LOGISTICS AREA
12' MAINTENANCE TRIAL
12' PUBLIC DIRT TRAIL
DIVERSION CHANNEL SIZE TO BE DETERMINED
12' SITE DIRT ACCESS ROAD
IVANPAH 3 SOLAR FIELD 200 MW
POWER TOWER (TYP.)
DETENTION POND I
SITE BOUNDARY LINE (TYP.)
POWER BLOCK
15' SITE GRAVEL ACCESS ROAD
ABOVE GROUND PIPING
EXISTING 4WD TRAILS, TYP
EXISTING MINING CLAIM
DIVERSION CHANNEL
DETENTION POND J
PAVED ASPHALT ROAD
EXISTING LIMESTONE HILL
30' PAVED ASPHALT ROAD
12' PUBLIC TRAIL
EXISTING METAMORPHIC HILL
DETENTION POND K
GAS METER STATION
IVANPAH 2 SOLAR FIELD 100 MW
150' DIVERSION CHANNEL
DETENTION POND F
DETENTION POND H
EXISTING OVERHEAD TRANSMISSION LINES (500KV WITH 100 FOOT ROW)
SOUTHWEST GAS CONSTRUCTION LAYDOWN AREA
EXISTING TRANSMISSION LINES
COLOSSEUM RD.
IVANPAH 1 SOLAR FIELD 100 MW
RELOCATED 30' GRAVEL COLUSEUM ROAD
SUBSTATION A
ADMINISTRATIVE/ STORAGE BUILDING
MONITORING WELL
SUBSTATION B
DETENTION POND D
EXISTING OVERHEAD DISTRIBUTION LINES (33KV)
EXISTING OVERHEAD TRANSMISSION LINES (SCE115KV)
DETENTION POND E
WELLS
DETENTION POND G
DETENTION POND A
12' SITE DIRT ACCESS ROAD
DETENTION POND C

800' 0 800' 1600' 2400'
Scale 1" = 800'

NOTE 1:
THE NATURAL SITE VEGETATION IS TO REMAIN IN PLACE AND UNDISTURBED IN EACH UNIT BETWEEN EVERY OTHER HELIOSTAT ROW WHERE LAND DISTURBING ACTIVITIES ARE NOT REQUIRED FOR THE ACCESS OF INSTALLATION EQUIPMENT OR MATERIALS.

REV	DATE	DESCRIPTION	ORIGINATOR	CHECKED	LEAD ENGINEER	ENGINEER/TECH SPECIALIST	PROJECT ENGINEERING MANAGER	PROJECT MANAGER
0	06/05/08	ISSUED FOR PERMITTING	GG	DW	BC	BC	DW	GB	JK

PRELIMINARY STATUS — DATE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED
LDC DAVID WILSON 06/05/08
APPROVED STATUS — DATE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDC — ORIGINATING PERSONNEL

DRAWN BY: GREG GRANT
CHECKED BY: DAVID WILSON
LEAD ENGINEER: BRAD CARVER
ENGINEER/TECH SPECIALIST: BRIAN GILBERT
PROJECT ENGINEERING MANAGER: DAVID WILSON
PROJECT MANAGER: JIM KIMURA

Zero Harm — Leadership, No Incidents, Safe Behavior

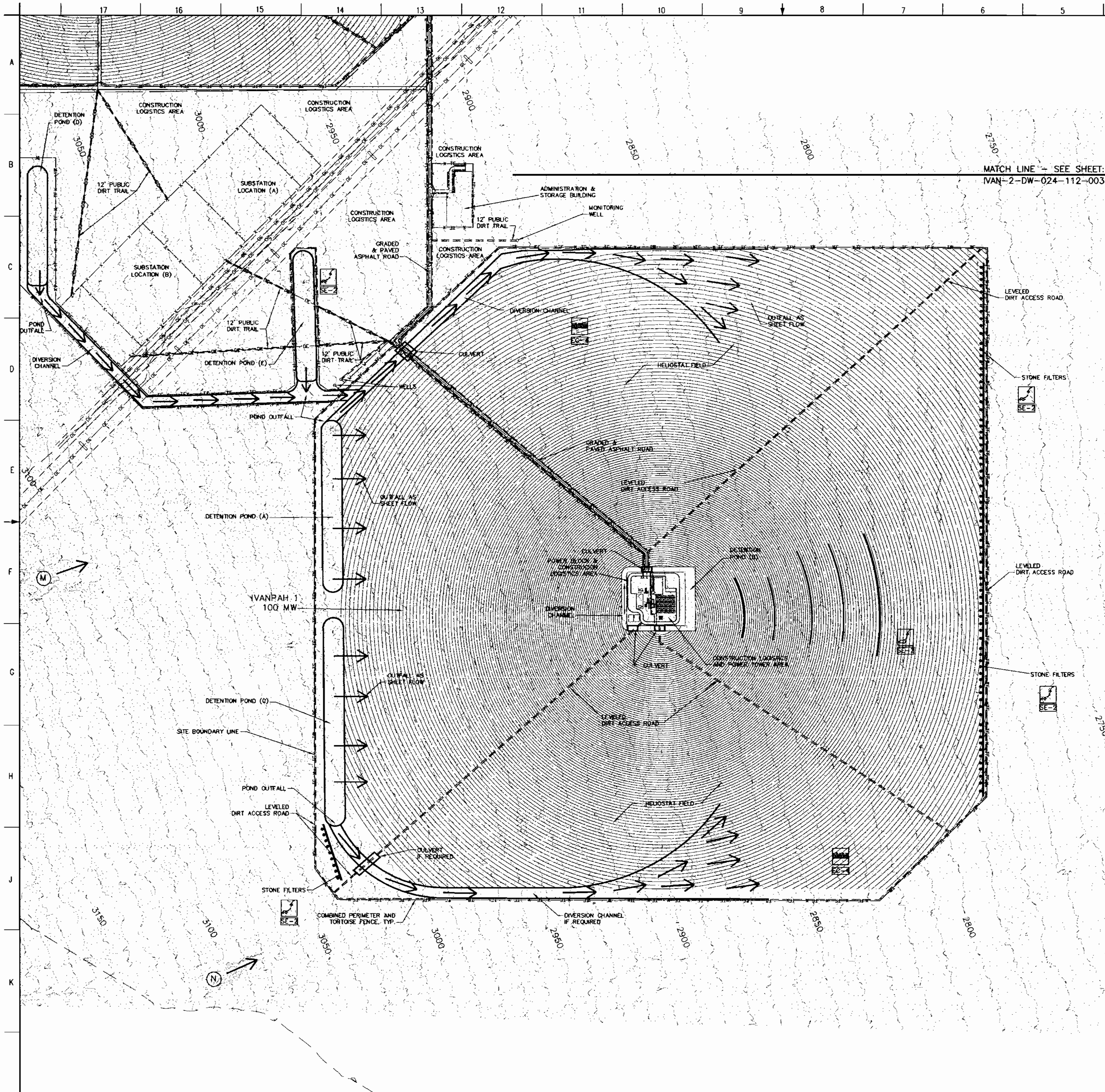
WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

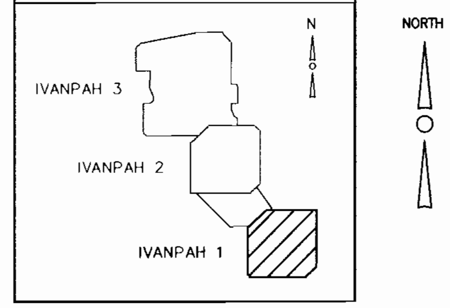
PLAN OF DEVELOPMENT
SITE GENERAL ARRANGEMENT PLAN
DRAWING 1 OF 7

SCALE: 1" = 800'-0" | DRAWING SIZE: ARCH E (36" x 48")
WORLEYPARSONS DWG. NO.: IVAN-0-DW-048-111-001 | REV: 0

PLOT DATE: 1/7/09



KEY PLAN
N.T.S.



LEGEND

ABOVEGROUND PIPING	
UNDERGROUND WATERLINE	
UNDERGROUND GASLINE	GAS
OVERHEAD ELECTRICAL	OE
POWERBLOCK FENCE	
30' PAVED ROAD	
15' GRAVEL ROAD	
12' LEVEL DIRT ROAD	
SITE BOUNDARY LINE	
COMBINED PERIMETER/TORTOISE FENCE	X—TF—X
EXISTING 4WD TRAILS	
EXISTING COLOSEUM ROAD	
MAJOR DRAINAGE AREA	(X)

EROSION SEDIMENT CONTROL LEGEND

SE-2	ROCK FILTER DAM	EC-4	DIVERSION BERM
TC-1	STABILIZED CONSTRUCTION ENTRANCE/EXIT	SE-2	CHECK DAMS
		SC-9	COMPACTED BRUSH BARRIER

300' 0 300' 600' 900'
Scale 1" = 300'

NOTE 1:
THE NATURAL SITE VEGETATION IS TO REMAIN IN PLACE AND UNDISTURBED IN EACH UNIT BETWEEN EVERY OTHER HELIOSTAT ROW WHERE LAND DISTURBING ACTIVITIES ARE NOT REQUIRED FOR THE ACCESS OF INSTALLATION EQUIPMENT OR MATERIALS

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/TECH SPEC	LEAD DISC ENGINEER	PROJ ENGR MANAGER	PROJECT MANAGER
0	06/05/08	ISSUED FOR PERMITTING	GG	DW	BC	BG	DW	GB	CB

PRELIMINARY STATUS — DATE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE DAVID WILSON 06/05/08
APPROVED STATUS — DATE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE

ORIGINATING PERSONNEL
DRAWN BY: GREG GRANT
CHECKED BY: DAVID WILSON
LEAD DESIGNER: BRAD CARVER
ENGINEER/TECH SPECIALIST: BRIAN GILBERT
PROJECT ENGINEERING MANAGER: DAVID WILSON
PROJECT MANAGER: JIM KIMURA

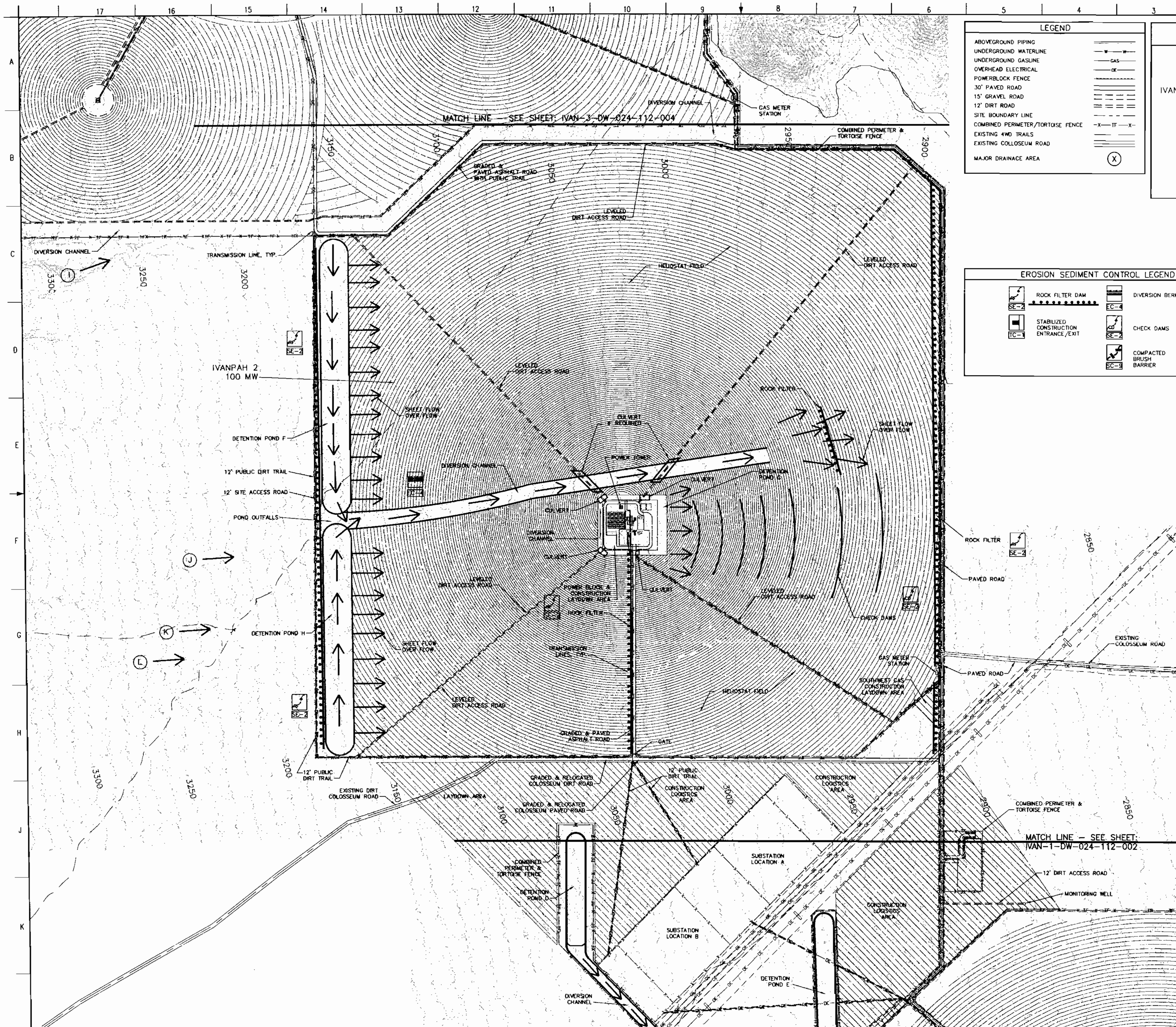
Zero Harm — Leadership, No Incidents, Safe Behavior

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC
GENERATING SYSTEM

IVANPAH 1
PLAN OF DEVELOPMENT
DRAINAGE PLAN
DRAWING 2 OF 7

SCALE: 1" = 300'-0"
DRAWING SIZE: ARCH E (36" x 48")
WORLEYPARSONS DWG. NO.: IVAN-1-DW-024-112-002
REV: 0
DWG-FILE:
DWG-DATE: 11/7/07



LEGEND

ABOVEGROUND PIPING	
UNDERGROUND WATERLINE	W
UNDERGROUND GASLINE	GAS
OVERHEAD ELECTRICAL	OE
POWERBLOCK FENCE	
30' PAVED ROAD	
15' GRAVEL ROAD	
12' DIRT ROAD	
SITE BOUNDARY LINE	
COMBINED PERIMETER/TORTOISE FENCE	X TF X
EXISTING 4WD TRAILS	
EXISTING COLLOSEUM ROAD	
MAJOR DRAINACE AREA	(X)

KEY PLAN
N.T.S.

IVANPAH 3
IVANPAH 2
IVANPAH 1
NORTH

EROSION SEDIMENT CONTROL LEGEND

SE-2 ROCK FILTER DAM	EC-4 DIVERSION BERM
TC-1 STABILIZED CONSTRUCTION ENTRANCE/EXIT	SE-2 CHECK DAMS
	SE-9 COMPACTED BRUSH BARRIER

NOTE 1:
THE NATURAL SITE VEGETATION IS TO REMAIN IN PLACE AND UNDISTURBED IN EACH UNIT BETWEEN EVERY OTHER HELIOSTAT ROW WHERE LAND DISTURBING ACTIVITIES ARE NOT REQUIRED FOR ACCESS FOR THE INSTALLATION EQUIPMENT OR MATERIALS.

300' 0 300' 600' 900'
Scale 1" = 300'

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/TECH. SPEC	LEAD DISC ENGINEER	PROJ ENGR MANAGER	PROJECT MANAGER
0	06 05 08	ISSUED FOR PERMITING	GG	DW	BC	BG	DW	GB	GB

PRELIMINARY STATUS — DATE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE DAVID WILSON 06/05/08
APPROVED STATUS — DATE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE

ORIGINATING PERSONNEL
DRAWN BY: GREG GRANT
CHECKED BY: DAVID WILSON
LEAD DESIGNER: BRAD CARVER
ENGINEER/TECH SPECIALIST: BRIAN GILBERT
PROJECT ENGINEERING MANAGER: DAVID WILSON
PROJECT MANAGER: JIM KIMURA

Zero Harm — Leadership, No Incidents, Safe Behavior

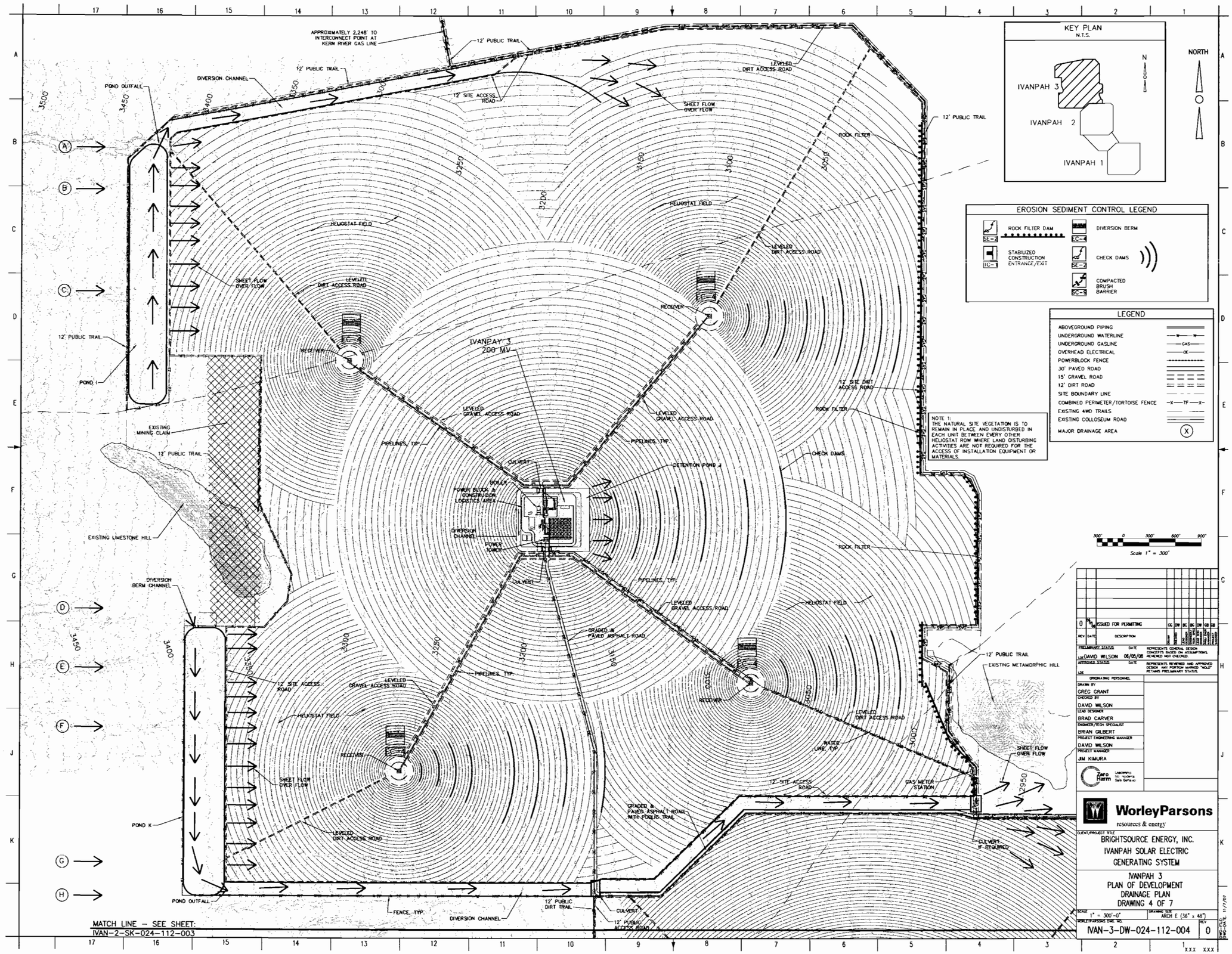
WorleyParsons resources & energy

CLIENT/PROJECT TITLE
BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

IVANPAH 2
PLAN OF DEVELOPMENT
DRAINAGE PLAN
DRAWING 3 OF 7

SCALE 1" = 300'-0" — DRAWING SIZE ARCH E (36" x 48")
WORLEYPARSONS DWG. NO. IVAN-2-DW-024-112-003 — REV 0

DWG-FILE:
DWG-DATE: 11/7/07



KEY PLAN
N.T.S.

NORTH

EROSION SEDIMENT CONTROL LEGEND

ROCK FILTER DAM SE-2	DIVERSION BERM EC-4
STABILIZED CONSTRUCTION ENTRANCE/EXIT TC-1	CHECK DAMS SE-2
	COMPACTED BRUSH BARRIER SC-9

LEGEND

ABOVEGROUND PIPING	
UNDERGROUND WATERLINE	W W
UNDERGROUND GASLINE	GAS
OVERHEAD ELECTRICAL	OE
POWERBLOCK FENCE	
30' PAVED ROAD	
15' GRAVEL ROAD	
12' DIRT ROAD	
SITE BOUNDARY LINE	
COMBINED PERIMETER/TORTOISE FENCE	X TF X
EXISTING 4WD TRAILS	
EXISTING COLLOSEUM ROAD	
MAJOR DRAINAGE AREA	X

NOTE 1:
THE NATURAL SITE VEGETATION IS TO REMAIN IN PLACE AND UNDISTURBED IN EACH UNIT BETWEEN EVERY OTHER HELIOSTAT ROW WHERE LAND DISTURBING ACTIVITIES ARE NOT REQUIRED FOR THE ACCESS OF INSTALLATION EQUIPMENT OR MATERIALS.

300' 0 300' 600' 900'
Scale 1" = 300'

REV	DATE	DESCRIPTION	DRAWN	LEAD DESIGNER	ENGINEER/TECH SPECIALIST	PROJECT ENGINEERING MANAGER	PROJECT MANAGER
0	11/7/07	ISSUED FOR PERMITTING	GG	DW	BC	BC	DW	KB	JK

PRELIMINARY STATUS — DATE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS REVIEWED, NOT CHECKED.
LDE DAVID WILSON 08/05/08
APPROVED STATUS — DATE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" REMAINS PRELIMINARY STATUS.
LDE

ORIGINATING PERSONNEL	
DRAWN BY	GREG GRANT
CHECKED BY	DAVID WILSON
LEAD DESIGNER	BRAD CARVER
ENGINEER/TECH SPECIALIST	BRIAN GILBERT
PROJECT ENGINEERING MANAGER	DAVID WILSON
PROJECT MANAGER	JIM KIMURA

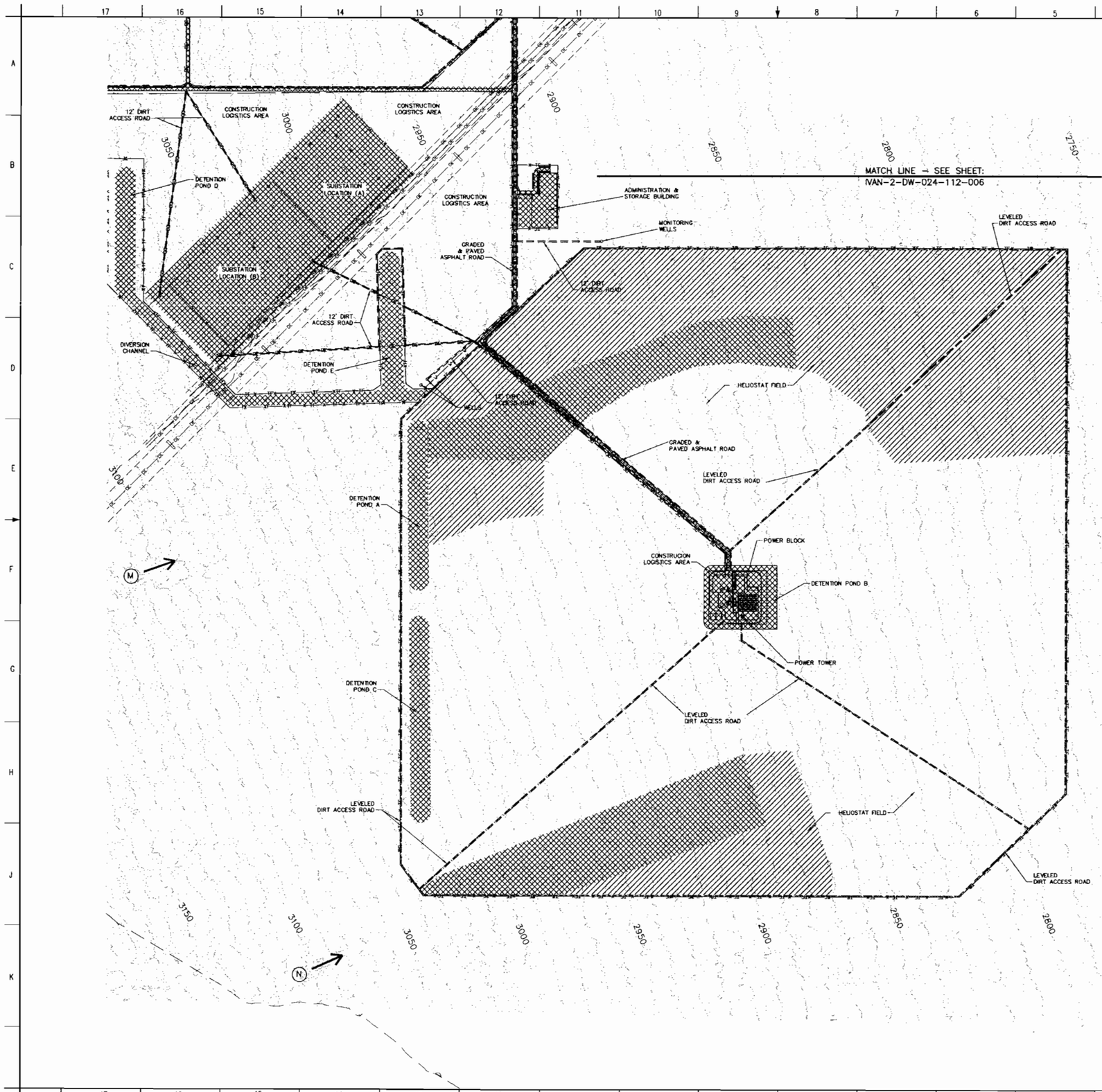
Zero Harm — LANDSCAPE TO HOUSING Safe Behavior

WorleyParsons
resources & energy

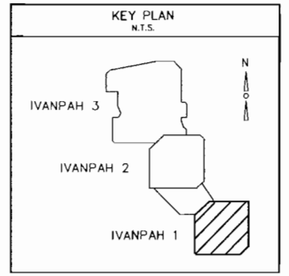
CLIENT/PROJECT TITLE
BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

IVANPAH 3
PLAN OF DEVELOPMENT
DRAINAGE PLAN
DRAWING 4 OF 7

SCALE 1" = 300'-0" | DRAWING SIZE ARCH E (36" x 48")
WORLEYPARSONS DWG. NO. IVAN-3-DW-024-112-004 | REV 0
DWG FILE: xxx xxx
DWG DATE: 11/7/07



KEY PLAN
N.T.S.



NORTH

LEGEND

POWERBLOCK FENCE (TYP)	
30' PAVED ROAD	
15' GRAVEL ROAD	
12' DIRT ROAD	
SITE BOUNDARY LINE	
COMBINED PERIMETER/TORTOISE FENCE	–X—TF—X–
EXISTING 4WD TRAILS	
EXISTING COLLOSEUM ROAD	
CLEARING (REMOVE VEGITATION ONLY) TO MINOR LEVELING & GRADE AS REQUIRED	NO HATCH (GRADE LINES ONLY)
MAJOR LEVELING TO LIGHT GRADING	
MAJOR GRADING	
MAJOR DRAINAGE AREA	X

300' 0 300' 600' 900'
Scale 1" = 300'

NOTE 1:
THE NATURAL SITE VEGETATION IS TO REMAIN IN PLACE AND UNDISTURBED IN EACH UNIT BETWEEN EVERY OTHER HELIOSTAT ROW WHERE LAND DISTURBING ACTIVITIES ARE NOT REQUIRED FOR THE ACCESS OF INSTALLATION EQUIPMENT OR MATERIALS.

REV	DATE	DESCRIPTION	ORIG	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/TECH SPECIALIST	PROJECT ENGINEERING MANAGER	PROJECT MANAGER
0	11/7/07	ISSUED FOR PERMITTING	GG	DW	BC	BG	DW	GB	JM

PRELIMINARY STATUS — DATE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS, REVIEWED NOT CHECKED.
LDE: DAVID WILSON 06/05/08
APPROVED STATUS — DATE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE

ORIGINATING PERSONNEL

DRAWN BY	GREG GRANT
CHECKED BY	DAVID WILSON
LEAD DESIGNER	BRAD CARVER
ENGINEER/TECH SPECIALIST	BRIAN GILBERT
PROJECT ENGINEERING MANAGER	DAVID WILSON
PROJECT MANAGER	JIM KIMURA

Zero Harm — Leadership for Incidents Safe Behavior

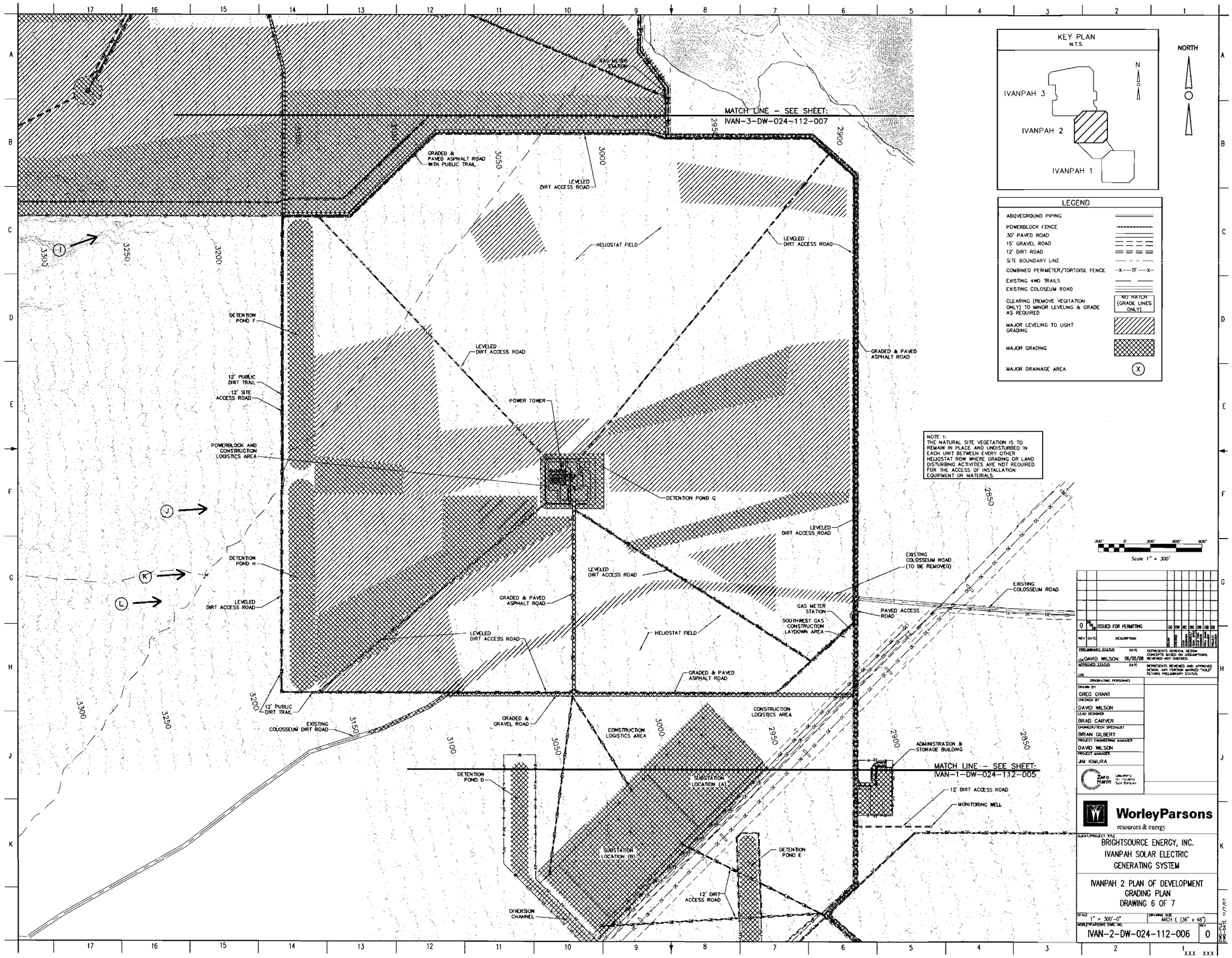
WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

IVANPAH 1
PLAN OF DEVELOPMENT
GRADING PLAN
DRAWING 5 OF 7

SCALE 1" = 300'-0" | DRAWING SIZE ARCH E (36" x 48") | REV.
WORLEYPARSONS DWG NO. IVAN-1-DW-024-112-005 | 0

DWG FILE
DWG DATE 11/7/07



KEY PLAN
N.T.S.

NORTH

LEGEND

- ABOVEGROUND PIPING
- POWERBLOCK FENCE
- 30' PAVED ROAD
- 15' GRAVEL ROAD
- 12' DIRT ROAD
- SITE BOUNDARY LINE
- COMBINED PERIMETER/TORTOISE FENCE –X—TF—X–
- EXISTING 4WD TRAILS
- EXISTING COLOSSEUM ROAD
- CLEARING (REMOVE VEGETATION ONLY) TO MINOR LEVELING & GRADE AS REQUIRED — NO HATCH (GRADE LINES ONLY)
- MAJOR LEVELING TO LIGHT GRADING
- MAJOR GRADING
- MAJOR DRAINAGE AREA (X)

NOTE 1:
THE NATURAL SITE VEGETATION IS TO REMAIN IN PLACE AND UNDISTURBED IN EACH UNIT BETWEEN EVERY OTHER HELIOSTAT ROW WHERE GRADING OR LAND DISTURBING ACTIVITIES ARE NOT REQUIRED FOR THE ACCESS OF INSTALLATION EQUIPMENT OR MATERIALS.

300' 0 300' 600' 900'
Scale 1" = 300'

REV	DATE	DESCRIPTION	GC	CM	MC	BC	DR	CB	CB
0	11/7/07	ISSUED FOR PERMITTING							

PRELIMINARY STATUS — DATE — REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS, REVIEWED NOT CHECKED.
LDE DAVID WILSON 06/05/08
APPROVED STATUS — DATE — REPRESENTS REVIEWED AND APPROVED DESIGN, ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE

ORIGINATING PERSONNEL

DRAWN BY	GREG GRANT
CHECKED BY	DAVID WILSON
LEAD DESIGNER	BRAD CARVER
ENGINEER/TECH SPECIALIST	BRIAN GILBERT
PROJECT ENGINEERING MANAGER	DAVID WILSON
PROJECT MANAGER	JIM KIMURA

Tetra Tech Harris — LANDSCAPE TECHNICAL SUPPORT

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

IVANPAH 2 PLAN OF DEVELOPMENT
GRADING PLAN
DRAWING 6 OF 7

SCALE 1" = 300'-0" — DRAWING SIZE ARCH E (36" x 48")
WORLEYPARSONS DWG NO. IVAN-2-DW-024-112-006 — REV 0

DWG FILE
DWG DATE 11/7/07

XXX XXX

APPROXIMATELY 2,011' TO INTERCONNECT POINT AT KERN RIVER GAS LINE

LEVELED DIRT ACCESS ROAD

12' PUBLIC DIRT TRAIL

LEVELED DIRT ACCESS ROAD

3500

3450

3400

3350

3300

3250

3200

3150

3100

3050

3000

2950

A

B

C

D

E

F

G

H

J

K

12' PUBLIC DIRT TRAIL

DETENTION POND I

HELIOSTAT FIELD

LEVELED DIRT ACCESS ROAD

LEVELED DIRT ACCESS ROAD

POWER TOWER

LEVELED DIRT ACCESS ROAD

EXISTING MINING CLAIM

12' PUBLIC TRAIL

LEVELED DIRT ACCESS ROAD

LEVELED GRAVEL ACCESS ROAD

PIPELINES (TYP)

PIPELINES (TYP)

DETENTION POND J

EXISTING LIMESTONE HILL

POWER TOWER

POWER BLOCK AND CONSTRUCTION LOGISTICS AREA

PIPELINES (TYP)

LEVELED GRAVEL ACCESS ROAD

HELIOSTAT FIELD

LEVELED GRAVEL ACCESS ROAD

GRADED & PAVED ASPHALT ROAD

PIPELINES (TYP)

POWER TOWER

LEVELED DIRT ACCESS ROAD

HELIOSTAT FIELD

WATER LINE (TYP)

SAS METER STATION

POWER TOWER

DETENTION POND K

LEVELED DIRT ACCESS ROAD

GRADED & PAVED ASPHALT ROAD

GRADED & PAVED ASPHALT ROAD WITH PUBLIC TRAIL

12' PUBLIC DIRT TRAIL

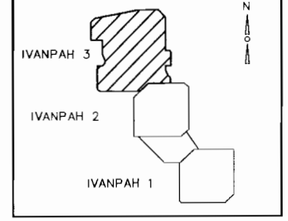
12' PUBLIC DIRT TRAIL

EXISTING METAMORPHIC HILL

LEVELED DIRT ACCESS ROAD

MATCH LINE – SEE SHEET: IVAN-2-DW-024-112-006

KEY PLAN
N.T.S.



NORTH

LEGEND

ABOVEGROUND PIPING	
POWERBLOCK FENCE (TYP)	
30' PAVED ROAD	
15' GRAVEL ROAD	
12' DIRT ROAD	
SITE BOUNDARY LINE	
COMBINED PERIMETER/TORTOISE FENCE	-X—TF—X-
EXISTING 4WD TRAILS	
EXISTING COLLOSEUM ROAD	
CLEARING (REMOVE VEGITATION ONLY) TO MINOR LEVELING & GRADE AS REQUIRED	NO MATCH (GRADE LINES ONLY)
MAJOR LEVELING TO LIGHT GRADING	
MAJOR GRADING	
MAJOR DRAINAGE AREA	(X)

NOTE 1:
THE NATURAL SITE VEGETATION IS TO REMAIN IN PLACE AND UNDISTURBED IN EACH UNIT BETWEEN EVERY OTHER HELIOSTAT ROW WHERE GRADING OR LAND DISTURBING ACTIVITIES ARE NOT REQUIRED FOR THE ACCESS OF INSTALLATION EQUIPMENT OR MATERIALS.

300' 0 300' 600' 900'
Scale 1" = 300'

REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/TECH SPECIALIST	PROJECT ENGINEERING MANAGER	PROJECT MANAGER
0	11/7/07	ISSUED FOR PERMITTING	GG	DW	BC	BG	DW	GB	DB

PRELIMINARY STATUS — DATE — REPRESENTS GENERAL DESIGN CONCEPTS AND ASSUMPTIONS. REVIEWED, NOT CHECKED.
LDC: DAVID WILSON 06/05/08
APPROVED STATUS — DATE — REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" REMAINS PRELIMINARY STATUS.
LDC

ORIGINATING PERSONNEL
DRAWN BY: GREG GRANT
CHECKED BY: DAVID WILSON
LEAD DESIGNER: BRAD CARVER
ENGINEER/TECH SPECIALIST: BRIAN GILBERT
PROJECT ENGINEERING MANAGER: DAVID WILSON
PROJECT MANAGER: JIM KIMURA

Zero Harm — Approved by Project Safety Engineer

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
BRIGHTSOURCE ENERGY, INC.
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

IVANPAH 3 PLAN OF DEVELOPMENT
GRADING PLAN
DRAWING 7 OF 7

SCALE: 1" = 300'-0" | DRAWING SIZE: ARCH E (36" x 48")
WORLEYPARSONS DWG NO.: IVAN-3-DW-024-112-007 | REV: 0

PLOT DATE: 11/7/07

xxx xxx

APPENDIX A

GEOTECHNICAL REPORT

GEOTECHNICAL ENGINEERING REPORT

SOLAR POWER PLANT
IVANPAH VALLEY
SAN BERNARDINO COUNTY, CALIFORNIA

Project No. 64075017
July 11, 2007

Prepared for:

BRIGHT SOURCE ENERGY, INC.
1999 HARRISON STREET, SUITE 500
OAKLAND, CALIFORNIA 94612

Prepared by:

TERRACON CONSULTANTS, INC.
750 PILOT ROAD, SUITE F
LAS VEGAS, NEVADA 89119
Phone: (702) 597-9393
Fax: (702) 597-9009

July 11, 2007

Bright Source Energy, Inc.
1999 Harrison Street, Suite 500
Oakland, California 94612

Attention: Mr. John Woolard

Subject: Geotechnical Engineering Report
Solar Power Plant
San Bernardino County, California
Terracon Project No. 64075017

Dear Mr. Woolard:

We are submitting the results of our geotechnical engineering study performed for the proposed Solar Power Plant in San Bernardino County, California. The accompanying report presents the results of our geotechnical exploration, laboratory testing, and engineering analyses, and provides preliminary design parameters for design of the project. The boring location diagram (Site and Exploration Plan) and individual boring logs are enclosed with this report.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar localities. No warranties, either expressed or implied are intended or made.

We appreciate the opportunity to be of service to you in this phase of the project and look forward to assisting you during the construction phase. If you have any questions concerning this report, or if we may be of further service to you, please contact us.

Sincerely,
TERRACON CONSULTANTS, INC

Segu I. Ifham, EI
Geotechnical Staff Professional

Les C. Banas, P.E.
Geotechnical Department Manager

TABLE OF CONTENTS

GEOTECHNICAL ENGINEERING REPORT
SOLAR POWER PLANT
IVANPAH VALLEY
SAN BERNARDINO COUNTY, CALIFORNIA

Project No. 64075017
July 11, 2007

INTRODUCTION

This report presents the results of our geotechnical engineering study performed for the proposed Solar Power Plant project. The project site is located in San Bernardino County, California, in the Ivanpah Valley, about two miles west of Ivanpah Dry Lake, just southwest of Primm. The general location of the project site is shown on Figure 1, Vicinity Map.

The purpose of our services was to explore the subsurface condition encountered in the borings, analyze and evaluate the test data and provide preliminary geotechnical engineering design parameters for the design of the project. The scope of our services did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic material in structures, surface water, groundwater, or air, below or around this site.

PROJECT DESCRIPTION

It is our understanding that the proposed development involves design and construction of a 100MW (Mega Watt) solar power plant using proprietary heliostat and receiver tower technology. The project site will cover an area of approximately 1000 acres of land that is under the jurisdiction of Bureau of Land Management.

No grading or structural plans for the project have been provided to us. However, it is our understanding that the contemplated heliostat and receiver towers will be supported by spread footings and/or shallow cast-in-place piles. It is also our understanding that detailed design of foundations will be performed after a detailed geotechnical investigation.

SITE EXPLORATION PROCEDURES

Field Exploration

The scope of our services for this project included a subsurface exploration program that consisted of drilling 2 borings to a depth of approximately 80 feet below existing grades.

The borings were drilled using an auger-type drill rig (CME-85) with a 6-inch diameter, continuous-flight, hollow-stem auger. Penetration testing and soil sampling were performed using the Standard Penetration Test procedure, and a 2-inch diameter split-spoon sampler, respectively. The penetration value (SPT "N-value") was reported as the number of blows required to advance the sampler 12 inches using a 140-pound hammer free-falling 30 inches. The test refusal criterion of 50 blows for less than 6 inches of penetration was used during field exploration.

The borings were logged by Terracon field personnel during drilling and soil samples were obtained at 2½- to 5-foot intervals to aid in material classification and for laboratory testing. Logs of the borings are presented on Plates A-1 through A-12. A key to the terms used on the boring logs is presented on Plate A-i, General Notes. The soils were classified in general accordance with the Unified Soil Classification System (USCS) as explained on Plate A-ii. The symbols and abbreviations used in the boring logs are defined on Plate A-iii.

The approximate locations of the borings are shown on Figure 2, Site and Exploration Plan. The locations of the borings were determined in the field by measuring from existing features or improvements and should be considered accurate only to the degree implied by the method used.

Laboratory Testing

Laboratory tests were conducted on selected soil samples to characterize relevant physical and engineering properties of the in-situ soils. The test results are presented in Appendix B of this report.

Moisture content tests were performed on representative soil samples as part of our laboratory program, and the test results are presented on the boring logs at the corresponding sampling depths.

Sieve analyses were performed to determine the grain-size distribution, and Atterberg limits test were performed to determine the liquid and plastic limits of the in-situ soil. These tests are generally used to assist in classification of soils, to determine soil consistency, to evaluate liquefaction potential of granular soils, and to provide correlations with engineering properties of the soils such as strength and compressibility. The test results are presented on Plate B-1 in Appendix B.

Direct shear tests were performed to determine the strength parameters of the in-situ soils. Tests were performed at field moisture content and at various surcharge pressures. The test results are used to estimate the internal friction angle and cohesion of the soils and are presented on Plate B-2 in Appendix B.

Atlas Consultants, Inc. performed chemical tests on representative soil samples. The tests were performed to determine the percentage of water-soluble sulfate present in the in-situ soil. The test result indicates the soil to be potentially corrosive to concrete. The chemical test results are presented on Plate B-3 in Appendix B.

The soil samples were classified in the laboratory based on visual observation, texture, plasticity, and the limited laboratory testing described above. The soil descriptions presented on the boring logs for native soils are in accordance with our General Notes and the Unified Soil Classification System (USCS) that are provided in Appendix A. The assigned USCS symbols for the corresponding soil types are also shown on the boring logs.

GEOLOGIC INFORMATION

The project site is located in the Ivanpah Valley, about two miles west of Ivanpah Dry Lake. According to a geologic map[1] of the area, the project site is underlain by Cenozoic non-marine (continental) sedimentary rocks and alluvial deposits. Precambrian rocks of all types including coarse-grained intrusives are present in the west part of the Ivanpah Valley. The north side of the Ivanpah Valley is underlain by Paleozoic sedimentary and volcanic rocks; in places strongly metamorphosed.

The cumulative evidence indicates that fissures are the result of a subsurface erosional process. The erosional process occurs in tensional fractures at or near the surface in uncemented, relatively fine-grained soils. No fissures were observed at the site during our exploration.

Two fault scarps have been mapped east and west of the project site, within 10 miles of the site. The origins of the faults are uncertain. One theory indicates the faults are a phenomena resulting from deep-seated differential consolidation of alluvial materials, with dissimilar grain size and compressibility characteristics, due to prehistoric large scale reductions in groundwater levels. Another theory is that they may have originated from tectonic processes and are part of a valley wide fault system. It is also possible that a combination of these factors could have resulted in these features.

SITE CONDITIONS

Surface

At the time of our exploration, the site was slightly to moderately undulating with moderate brush vegetation on the surface. Ground access to the site was via Colosseum Road which was an unpaved roadway. Colosseum Road extended in the east-west direction through the center of the project site. A limestone outcrop was found in the northeast portion of the site. An overhead power-line stretched across the site in the northeast-southwest direction. Drainage appeared to be by sheet flow to the east.

Subsurface

The native soils encountered in the borings consisted predominantly of coarse-grained soils ranging from medium dense to very dense, silty sand, gravelly sand, clayey sand, and sandy gravel. Very dense to moderately hard partially cemented sand and gravel were also occasionally encountered in the borings.

The moisture content of the tested soil samples was very low, indicating the dry nature of in-situ soils, and possibility of deeper groundwater table.

---

[1] James F. Davis, 2002 "Geologic Map of California", California Department of Conservation, California Geological Survey.

Groundwater was not encountered to the depths explored in the borings. It should be noted, however, that groundwater levels can fluctuate due to seasonal variations, irrigation practices, and groundwater withdrawal and recharge. The boring logs and laboratory test results presented in the appendices should be referred to for more detailed information regarding the on-site soils.

CONCLUSIONS AND RECOMMENDATIONS

Geotechnical Considerations

Our recommendations are based on the assumption that the soil conditions throughout the site are similar to those disclosed by the explorations. If variations are noted during the detailed investigation in a later phase of this project, we should be notified so we can supplement our recommendations, as applicable.

In general, the on-site native soils consist of alluvial deposits and are expected to exhibit high to very high shear strength and low to very low compressibility.

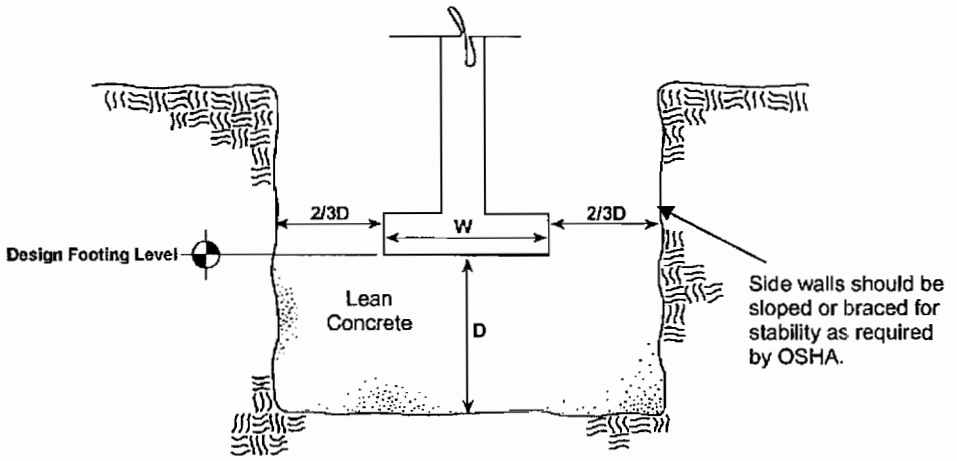
Conventional Foundations

If the grading recommendations presented in the *Earthwork* section of this report are complied with, the lightweight structures may be supported by conventional type foundations (spread footings) established on undisturbed non-cemented natural soils having a consistency of at least medium dense, and/or partially cemented natural deposits, and/or approved, properly compacted fill.

Conventional foundations established on natural non-cemented soils having a consistency of at least medium dense and/or approved, properly compacted fill as recommended should be at least 12 inches wide and the bottom of the footings should be established at least 12 inches below the lowest adjacent final compacted subgrade (generally pad grade). Foundations established as recommended, may be designed to impose a net dead- plus live-load pressure of 2000 pounds per square foot (psf). The bearing value may be increased by 500 psf for each additional 12 inches of embedment. However, the maximum net bearing value should not exceed 4000 psf. A one-third increase may be used for transient conditions such as wind or seismic loading.

If conventional foundations are established on cemented soils having a consistency of at least moderately hard, they should be at least 12 inches wide and the bottom of the footings should be established at least 12 inches below the lowest adjacent final compacted subgrade (generally pad grade). Foundations established as recommended, may be designed to impose a net dead- plus live-load pressure of 3500 pounds per square foot (psf). The bearing value may be increased by 1000 psf for each additional 12 inches of embedment. However, the maximum net bearing value should not exceed 6000 psf. A one-third increase may be used for transient conditions such as wind or seismic loading.

In some instances, cemented soil may be located deeper than the design elevation of the bottom of foundations. Rather than extend the depth of embedment, lean concrete may be used as fill between the planned design bottom of the foundation and the top of the undisturbed cemented soil deposits. Overexcavation for placement of lean concrete below footing base levels should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation as shown on the figure below. The overexcavation should then be backfilled up to the footing base elevation with lean concrete having a 20-day compressive strength of at least 1000 psi.



To reduce the effects of possible differential settlement, foundations should not be established partly on cemented deposits and partly on compacted granular fill/undisturbed soil deposits. Foundations for the entire structure should either be supported on cemented deposits/concrete backfill, or on properly compacted granular fill and/or undisturbed soils having a consistency of at least dense.

Without structural loading information, we cannot estimate total and differential settlements of the proposed structures. Once this information become available, we can provide settlement estimates accordingly.

Observation and inspection of foundation excavations and subgrade preparations, as well as field and laboratory testing of subgrade materials should be carried out in accordance with the guidelines provided in Table 1704.7 of the 2006 International Building Code (IBC).

Shallow Drill Shafts

If the grading recommendations presented in the *Earthwork* section of this report are complied with, the proposed heavyweight structures, and structures anticipated to carry considerable lateral loads may be supported on drilled shafts.

Drilled shaft foundations established as recommended should extend to at least 5 diameters below the lowest adjacent final compacted subgrade. The load carrying capacity of a drilled

shaft should be derived from its skin friction between cast-in-place concrete and in-situ soils. The skin friction resistance of the upper 3 feet of the shaft should not be included in deriving the load carrying capacity. For preliminary design, the effective ultimate skin friction of the deep foundations may be taken as 2.0 kips per square foot (ksf) in compression at depths greater than 2 diameters below the top of the embedded pile. Recommended factor of safety for skin friction to obtain allowable shaft capacity is 2.5. For example, a two-foot diameter and ten-foot deep drilled shaft should provide an ultimate load carrying capacity of 75 kips and an allowable load carrying capacity of 30 kips in compression.

The uplift capacity of the drilled shafts may be taken as 70 percent of the axial capacity in compression at that depth. The recommended axial capacities may be increased by ⅓ for short-term transient loading conditions such as wind or seismic loading.

The load carrying capacity of a group of drilled shafts may be less than the sum of the individual shaft capacities. Evaluation of the axial capacity of a group of shafts should consider the subsurface soil conditions, spacing between adjacent shafts, and the number of rows and columns in a shaft group.

Once the structural loading is finalized, settlement of the proposed shafts should be estimated, and be within the specified limits. In addition to the settlement by soil movement, there will be movements due to inadequate preparation of the bearing surface and shrinkage of the concrete. Observation and inspection of foundation excavations and subgrade preparations, as well as field and laboratory testing of subgrade materials should be carried out in accordance with the guidelines provided in Table 1704.7 of the 2006 IBC.

Lateral loads for drilled shafts with a slenderness ratio (length to diameter) of less than 10 may be resisted by passive resistance of the adjacent soils. For design purposes, the ultimate passive resistance of native soils may be assumed to be equal to the pressure developed by a fluid with a unit weight of 325 pounds per cubic foot (pcf). The passive resistance of the soils should be ignored in the upper 3 feet below finish grade. The maximum value of passive pressure should not exceed 3,500 pounds per square foot. The recommended values may be increased by one-third for short-term transient conditions such as wind and seismic loading. Appropriate factors of safety should be applied to the ultimate passive pressure values to obtain allowable lateral capacities. Once the structural loads are finalized, further analyses should be carried out to estimate the total lateral deflection of drilled shafts.

Successful installation of drilled shafts depends to a large extent on the suitability of the equipment and installation procedures used. Excavation for drilled shafts on this site may become difficult due to the presence of caliche, cemented sand and gravel, and granular soils containing cobbles. The drilling equipment should be selected and sized accordingly to penetrate the anticipated soil strata to the required depth to develop the adequate design capacity. Methods and equipment used for drilled shaft installation should leave the sides

and bottom of the shaft free of loose and disturbed material that would prevent the concrete from contacting undisturbed soil.

The shaft excavation should not be allowed to stand open overnight. The excavation should be filled with concrete as soon as possible after inspection. We recommend that concrete be placed in the bottom of the drilled shaft excavation using a tremie. The end of the tremie should be closed or plugged until it reaches the bottom of the excavated hole. The placement of concrete in the tremie will then open the "valve", and concrete placement can proceed. Steps should be taken to ensure that the tip of the tremie remains at the bottom of the excavation until at least 5 feet of concrete have been placed, and remains at least 5 feet below the top of the concrete thereafter, until placement is complete.

Preliminary Design Parameters

For the purpose of preliminary design, based on the general soil type encountered at the site and laboratory test results, we estimated the following soil design parameters:

- Modulus of Horizontal Subgrade Reaction (K_h).....600 pci
- Horizontal Elastic Modulus (E_h).....7000 psi
- Permeability (k).....0.01 cm/s

It should be noted that presently no well established and generally accepted procedures and standards exist in estimating the K_h and E_h parameters of soils. No standard methods have been put forward to quantify E_h of in-situ soils; however, it has been experimentally proven that the modulus of deformation for horizontal deformation of soil is less than the vertical modulus of deformation.

In addition, permeability can have a wide range of values across the project site. It has been reported by Duncan (2000) that the coefficient of variation (V) of permeability of in-situ soil can be as high as 240 percent. Therefore, the presented values should be considered approximate and average.

In design of laterally loaded piles, instead of using classical methods, we rather suggest using generally accepted state-of-the-art methods such as a computer program LPILE. This is a special purpose program based on rational procedures for analyzing a pile under lateral loading developed by Ensoft, Inc. The program computes deflection, shear, bending moment, and soil response with respect to depth in nonlinear soils. Components of the stiffness matrix at the pile head may be computed internally by the program to help the users in their super-structure analysis.

Considering the large area of the project site (approximately 1000 acres), we recommend pumping well tests be performed across the site to determine the permeability of the in-situ soils more accurately.

Seismic Considerations

The following USGS grid points were used to determine the spectral accelerations at the project site.

Latitude	36.55°
Longitude	-115.46°

On June 19, 2007, the USGS website (Earthquake Hazards Program, Interpolated Probabilistic Ground Motion for the Conterminous 48 States by Latitude Longitude, 2002 Data) indicated the following respective spectral accelerations for 0.2 seconds (SA) and 1.0 second (SA) periods for 2% probability of exceedance (PE) in 50 years.

Period	Spectral Acceleration
0.2 s, S_s	0.36g
1.0 s, S_1	0.17g

For the purpose of seismic design, the Site Class was determined based on the criteria presented on Section 1613.5.2, Site Class Definitions, of the 2006 International Building Code (IBC). Based on our knowledge of the site and its soil conditions, the site should be designated Site Class D.

Adjusting the Site Class B, S_S and S_1 values for Site Class D, the five-percent damped design spectral acceleration at short periods, S_{DS}, is 0.36g, and at 1-second period, S_{D1}, is 0.24g.

Lateral Earth Pressures

For soils above any free water surface, with level backfill and no surcharge loads, we recommend the following equivalent fluid pressures and coefficient of friction:

- Active .....35 pcf
- At rest.....55 pcf
- Passive.....300 pcf
- Coefficient of friction.....0.30

Notes:

1. Active pressure assumes unrestrained (cantilever) wall and assumes no loading from heavy compaction equipment.
2. Passive pressure should not exceed a maximum of 3,500 psf. A one-third increase may be used for wind or seismic loads.
3. The passive pressure and the frictional resistance of the soils may be combined without reduction in determining the total lateral resistance.
4. The aforementioned values do not include appropriate safety factors.

The lateral seismic pressure acting on a retaining (yielding) wall can be estimated by the method developed by Seed and Whitman, as noted in the 2000 NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures, where the total lateral thrust, P_{AE} in terms of its static component, P_A, and the dynamic (seismic) incremental force, ΔP_{AE}, is equal to:

$$P_{AE} = P_A + \Delta P_{AE}$$

Where the dynamic component, $\Delta P_{AE} = {}^3/_8(k_h)H^2\gamma$,

- k_h is equal to $S_{DS}/2.5$
- H is the height of the wall in feet
- γ is equal to the unit weight of the backfill material, in pcf

The resultant dynamic force, ΔP_{AE}, acts at a distance of 0.6H above the base of the wall.

For this site,

- $k_h = 0.15g$
- $\gamma = 130$ pcf
- $\Delta P_{AE} = 7.3\ H^2$ (lb/linear foot of wall)

Because the total lateral force, P_{AE}, is considered a short-term loading condition, a one-third increase in the bearing pressure and passive resistance may be allowed for dynamic (seismic) analysis.

The lateral seismic pressure acting on a rigid, non-yielding wall can be estimated by the method developed by Wood, as noted in the 2000 NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures, where the dynamic (seismic) thrust, ΔP_E, is approximated at:

$$\Delta P_E = k_h H^2 \gamma,$$

- k_h is equal to $S_{DS}/2.5$
- H is the height of the wall in feet
- γ is equal to the unit weight of the backfill material, in pcf

The resultant dynamic thrust, ΔP_E, acts at a distance of 0.6H above the base of the wall.

For this site,

- $k_h = 0.15g$
- $\gamma = 130$ pcf
- $\Delta P_E = 19.5\ H^2$ (lb/linear foot of wall)

Any surcharge from adjacent loadings should be added to the above pressures using a factor of 0.30. As indicated, the aforementioned pressures assume that there will be no build-up of hydrostatic pressure. Therefore, if walls will be subject to saturated conditions, we recommend that weep holes (if practical) or a wall drainage system be provided, and that the structural fill

behind retaining walls be granular and free draining. All walls below grade should be waterproofed.

Fill against foundations, grade beams, basement and retaining walls should be properly placed and compacted. Backfill should be mechanically compacted in layers (6 to 8 inches maximum uncompacted thickness); flooding should not be permitted. Backfill within 2 feet of the back of retaining and basement walls should be compacted to at least 90 percent of the maximum dry density obtainable by the ASTM D1557 method. Care should be taken when placing backfill, so as not to damage the walls. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors. Overcompaction may cause excessive lateral earth pressures that could result in wall movements.

Earthwork

Site Clearing

- All existing vegetation, debris, uncontrolled fill, disturbed natural soils, and other deleterious materials should be stripped out and removed from proposed structural areas, adjacent walks and slabs.
- All exposed surfaces should be free of mounds and depressions that could prevent uniform compaction.
- If unexpected fills or underground facilities are encountered during site clearing, such features should be removed and the excavation thoroughly cleaned and backfilled. All excavations should be observed by the geotechnical engineer prior to backfill placement.
- Demolition of existing structures, if any, should include removal of any foundation system and utilities. Any excavations performed as a result of demolition and removal should be properly filled and compacted in accordance with recommendations provided in this section.
- All materials derived from the demolition of existing structures should be removed from the site, and not be allowed for use in any fills.

Excavation

- It is anticipated that excavation of the on-site natural non-cemented deposits for the proposed project can be accomplished with conventional earthmoving equipment.
- In cases of hard or very hard cemented soils encountered during excavation, specialized excavating equipment may be required to handle such conditions.
- Contractors should satisfy themselves as to the hardness of materials and equipment required.

- Excavations into the on-site soils may encounter caving soils, depending upon the final depth of excavation. The individual contractor(s) should be made responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and the bottom. All excavations should be sloped or shored in the interest of safety following local and federal regulations, including current OSHA excavation and trench safety standards.

Fill Materials

- Fill containing oversize material should not be used in any utility trenches, behind retaining walls or against foundations or grade beams.
- Imported material should be compatible with on-site soils in addition to being suitable for its intended use. All imported materials should be approved by the geotechnical firm providing testing during construction, prior to importing.
- On site and imported soils used as fill should conform to the following:
  - Gradation (ASTM C136): Percent Finer by Weight:
    - 6" 100
    - 3" 70-100
    - No. 4 Sieve 35-100
    - No. 200 Sieve 5-30
  - Liquid Limit 30
  - Plasticity Index 15
  - Maximum expansive potential (%) 4.0
  - Maximum Sulfate Content (%) 0.09
  - Solubility 0.5
- Soil used as backfill behind retaining walls should conform to the following:
  - Gradation (ASTM C136): Percent Finer by Weight:
    - 3" 100
    - ¾" 70-100
    - No. 4 Sieve 20-70
    - No. 200 Sieve ..... 10 (max)
  - Plasticity Index ..... Non-plastic
  - Maximum expansive potential (%) ..... Non-expansive
  - Maximum Sulfate Content (%) 0.09
  - Maximum solubility (%) ..... Non-Soluble

Fill Placement and Compaction

- After performing required excavations, the exposed soils should be carefully observed to verify removal of all unsuitable deposits. Exposed soils should then be scarified to a depth of 6 inches, moisture conditioned as necessary, and compacted as recommended.
- Fill materials should be placed on a horizontal plane unless otherwise accepted by the geotechnical engineer.
- All required fill should be placed in loose lifts not over 8 inches in thickness.
- Materials should be compacted to the following:

MATERIAL	PERCENT DENSITY (ASTM D1557)	MOISTURE CONTENT
Granular	95 minimum	-2 to +2 percentage points of optimum
Fine – grained	90 minimum	0 to +2 percentage points over optimum

Note:

1. For the purpose of compaction, fine-grained soils are soils with at least 30 percent passing the No. 200 sieve and/or soils having an expansion greater than 4 percent.
2. All fill placed deeper than 5 feet below final grade should be compacted to a minimum of 95 percent.

- Field density tests should be taken for approximately each 1½ feet in elevation gain after compaction, but not to exceed 3 feet in vertical height between tests. Field density tests may have to be taken at intervals of 6 inches in elevation gain, if required by the Engineer. The locations of the tests in the plan shall be so spaced to give the best possible coverage; however, the tests shall be taken no further apart than 75 feet. The Engineer may take additional tests as considered necessary to check on the uniformity of compaction. Where sheepsfoot rollers are used, the tests shall be taken in the compacted material below the disturbed surface. No additional layers of fill shall be spread until the field density tests indicate that the specified density has been obtained.

Drainage and Moisture Protection

Foundation soils should not be allowed to become saturated during or after construction. Infiltration of water into foundation or utility excavations should be prevented during construction.

Positive drainage away from the structure should be provided during construction and maintained throughout the life of the structure. Any downspouts, roof drains or scuppers should discharge into splash blocks or extensions and away from the structures. Backfill against footings, exterior walls and in utility trenches should be properly compacted and free of all construction debris to reduce the possibility of moisture infiltration.

Performance of the foundation system recommended in this report is dependent on the ability to keep moisture from penetrating the native soils below foundations. Therefore, we recommend the following:

- No landscaping or irrigation should be allowed within 5 feet of the structures.
- Positive drainage of 2 percent minimum should be maintained away from structures, adjoining concrete slabs and block walls at a distance of at least 10 feet, where feasible.
- Landscaping irrigation should be kept to a minimum.
- Any planter areas adjacent to the structures should be sealed.

Floor Slabs

If grading recommendations are complied with, concrete floor slabs may be supported on a 4-inch layer of Type II material. The use of a vapor retarder should be considered beneath concrete slabs-on-grade that will be covered with wood, tile, carpet or other moisture-sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer and slab contractor should refer to ACI 302 for procedures and cautions regarding the use and placement of a vapor retarder.

Recommendations presented by the American Concrete Institute for slabs-on-grade should be complied with for all concrete placement and curing operations. Improper curing techniques and/or excessive slump (water-cement ratio) could cause excessive drying/shrinkage resulting in random cracking and/or slab curling. Concrete slabs should be allowed to cure adequately before placing vinyl or other moisture sensitive floor coverings.

Corrosivity

The results of our laboratory tests indicate that the tested soils have a negligible classification for sulfate exposure in accordance with Table 4.3.1 of the American Concrete Institute (ACI) 318, Section 4.3. However, based on our experience with soils in the general area of the project site, a potential exists for severe sulfate-content soils to be present at the site. Therefore, we recommend that additional tests should be performed in the detailed investigation phase of this project to determine the sulfate exposure classification and appropriate concrete should be selected in accordance with Table 4.3.1 of the American Concrete Institute (ACI) 318, Section 4.3.

GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide testing and observation during excavation, grading, foundation and construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

CLOSURE

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar localities. No warranties, either expressed or implied, are intended or made. We prepared this report as an aid in design of the proposed project. This report is not a bidding document. Any contractor reviewing this report must draw his own conclusions regarding site conditions and specific construction techniques to be used on this project.

We trust this report provides you with the information you require at this time. If you have any questions, please do not hesitate to contact us.

Sincerely,
TERRACON CONSULTANTS, INC.

Segu I. Ifham, EI
Geotechnical Staff Professional

Les C. Banas, P.E.
Geotechnical Department Manager

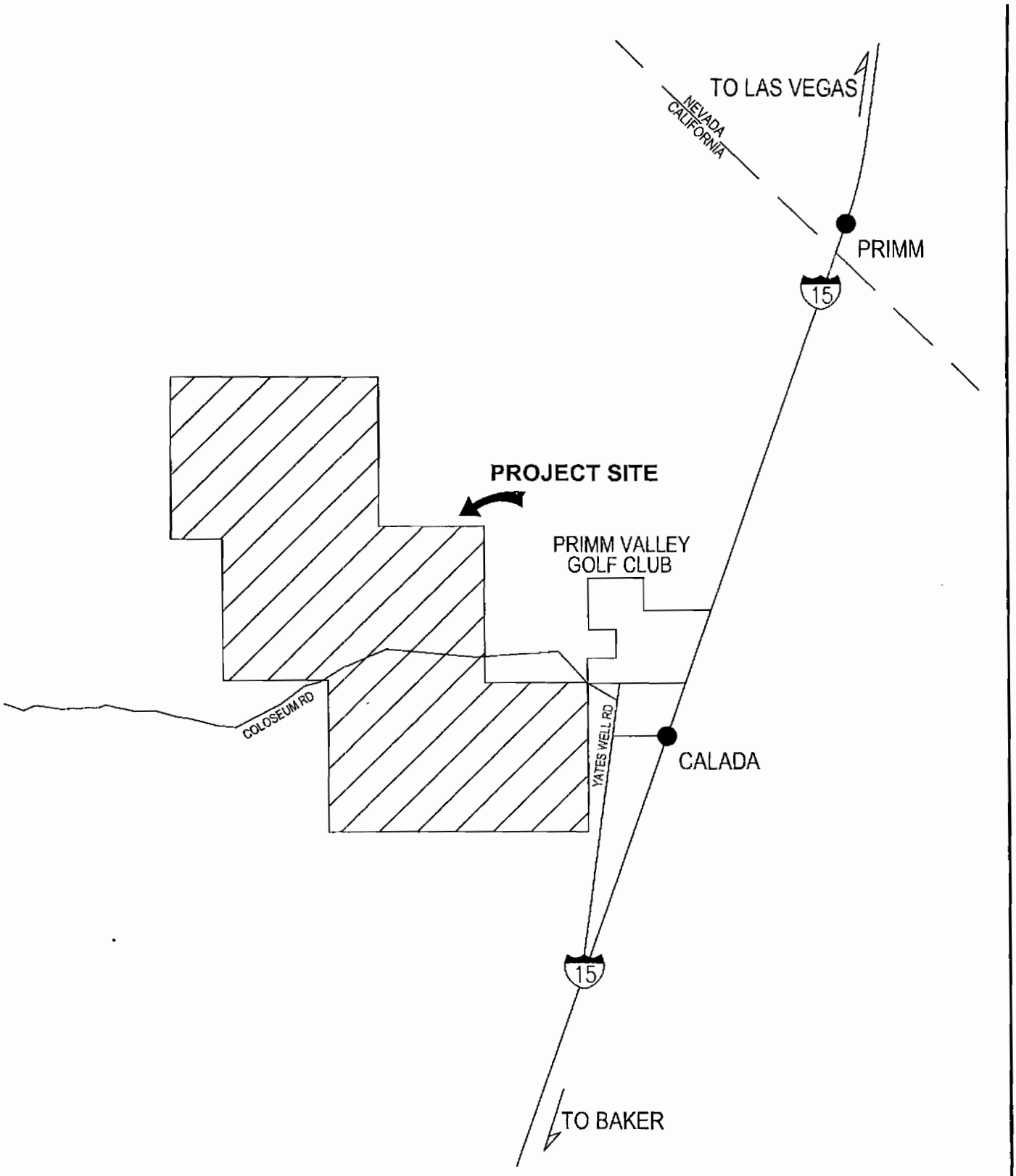
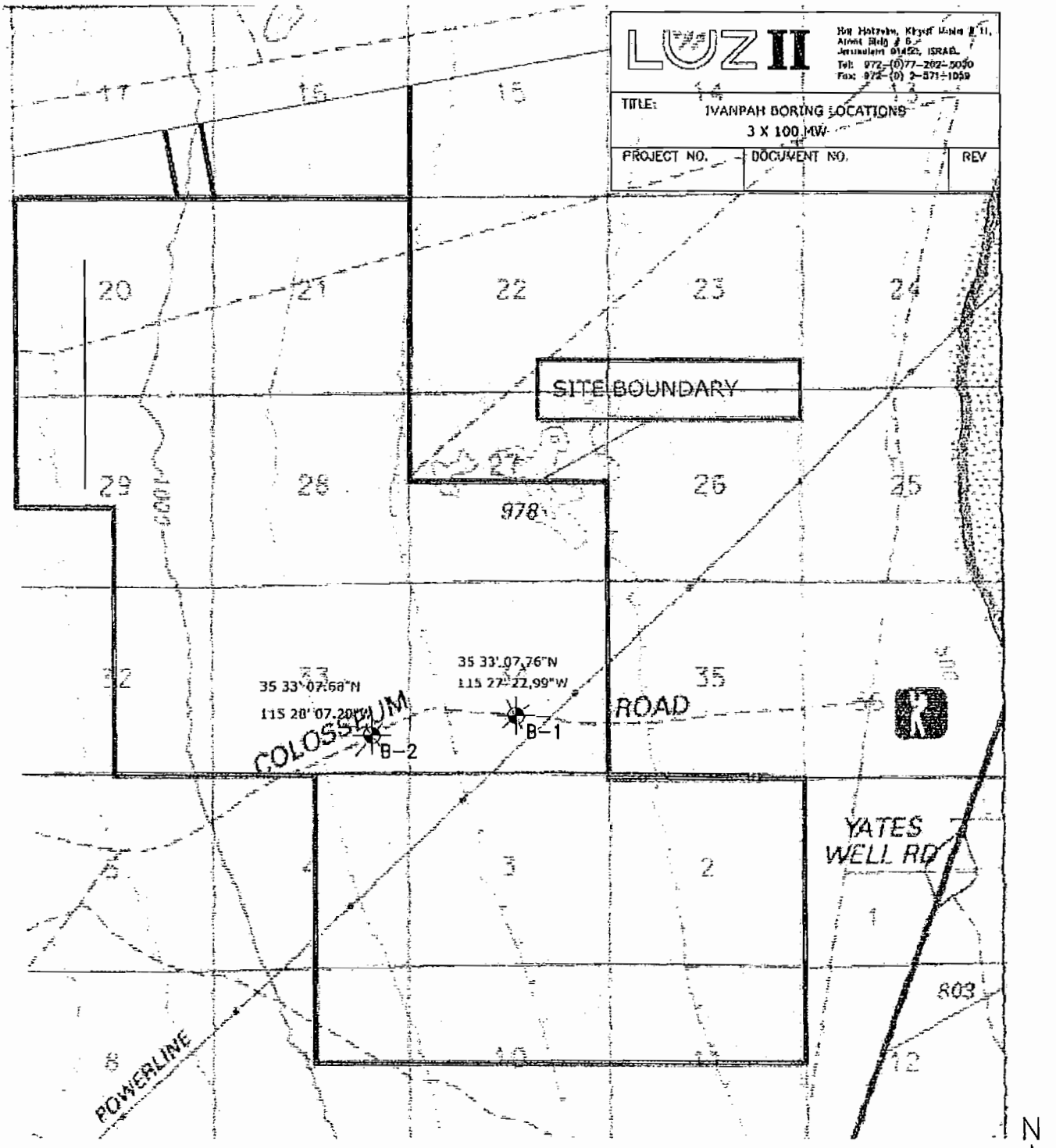


DIAGRAM IS FOR GENERAL LOCATION ONLY,
AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr: SII	Project No. 64075017	Terracon Consulting Engineers and Scientists	VICINITY MAP	FIGURE
Drawn By: BWB	Scale: N.T.S.	750 PILOT ROAD, SUITE F LAS VEGAS, NV 89119	BRIGHT SOURCE ENERGY, INC.	1
Checked By: SII	File No. 75017.dwg	PH. (702) 597-9393 FAX. (702) 597-9909	SOLAR POWER PLANT	
Approved By: SII	Date: 6/20/07		IVANPAH VALLEY	
			SAN BERNARDINO COUNTY CALIFORNIA	



EXPLANATION:

B-1 ⊕ – APPROXIMATE BORING LOCATION

DIAGRAM IS FOR GENERAL LOCATION ONLY,
AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr	SII
Drawn By:	BWB
Checked By:	SII
Approved By:	SII

Project No.	64075017
Scale:	N.T.S.
File No.	75017.dwg
Date:	6/20/07

Terracon
Consulting Engineers and Scientists
750 PILOT ROAD, SUITE F LAS VEGAS, NV 89119
PH. (702) 597-9393 FAX. (702) 597-9009

SITE AND EXPLORATION PLAN
BRIGHT SOURCE ENERGY, INC.
SOLAR POWER PLANT
IVANPAH VALLEY
SAN BERNARDINO COUNTY CALIFORNIA

FIGURE
2

APPENDIX A

Site Explorations

The borings were logged during drilling and soil samples were obtained at 2½- to 5-foot intervals to aid in material classification and for laboratory testing. Logs of the borings are presented on Plates A-1 through A-12. A key to the terms used on the boring logs is presented on Plate A-i, General Notes. The soils were classified in general accordance with the Unified Soil Classification System (USCS) as explained on Plate A-ii. The symbols and abbreviations used in the boring logs are defined on Plate A-iii.

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon - 1-3/8" I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
ST:	Thin-Walled Tube - 2" O.D., unless otherwise noted	PA:	Power Auger
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
DB:	Diamond Bit Coring - 4", N, B	RB:	Rock Bit
BS:	Bulk Sample or Auger Sample	WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value". For 3" O.D. ring samplers (RS) the penetration value is reported as the number of blows required to advance the sampler 12 inches using a 140-pound hammer falling 30 inches, reported as "blows per foot," and is not considered equivalent to the "Standard Penetration"or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling	N/E:	Not Encountered
WCI:	Wet Cave in	WD:	While Drilling		
DCI:	Dry Cave in	BCR:	Before Casing Removal		
AB:	After Boring	ACR:	After Casing Removal		

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-value (SS) Blows/Ft.	Consistency
< 500	<2	Very Soft
500 – 1,000	2-3	Soft
1,001 – 2,000	4-6	Medium Stiff
2,001 – 4,000	7-12	Stiff
4,001 – 8,000	13-26	Very Stiff
8,000+	26+	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Standard Penetration or N-value (SS) Blows/Ft.	Ring Sampler (RS) Blows/Ft.	Relative Density
0 – 3	0-6	Very Loose
4 – 9	7-18	Loose
10 – 29	19-58	Medium Dense
30 – 49	59-98	Dense
50+	99+	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 – 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 – 12
Modifiers	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1-10
Medium	11-30
High	30+

Terracon

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]					Soil Classification	
					Group Symbol	Group Name[B]
Coarse Grained Soils	Gravels	Clean Gravels	Cu ≥ 4 and 1 ≤ Cc ≤ 3[E]		GW	Well-graded gravel[F]
More than 50% retained	More than 50% of coarse fraction retained on No. 4 sieve	Less than 5% fines[C]	Cu < 4 and/or 1 > Cc > 3[E]		GP	Poorly graded gravel[F]
on No. 200 sieve		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH		GM	Silty gravel[F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel[F,G,H]
	Sands	Clean Sands	Cu ≥ 6 and 1 ≤ Cc ≤ 3[E]		SW	Well-graded sand[I]
	50% or more of coarse fraction passes No. 4 sieve	Less than 5% fines[D]	Cu < 6 and/or 1 > Cc > 3[E]		SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH		SM	Silty sand[G,H,I]
			Fines Classify as CL or CH		SC	Clayey sand[G,H,I]
Fine-Grained Soils	Silts and Clays	inorganic	PI > 7 and plots on or above "A" line[J]		CL	Lean clay[K,L,M]
50% or more passes the No. 200 sieve	Liquid limit less than 50		PI < 4 or plots below "A" line[J]		ML	Silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OL	Organic clay[K,L,M,N] / Organic silt[K,L,M,O]
	Silts and Clays	inorganic	PI plots on or above "A" line		CH	Fat clay[K,L,M]
	Liquid limit 50 or more		PI plots below "A" line		MH	Elastic Silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OH	Organic clay[K,L,M,P] / Organic silt[K,L,M,Q]
Highly organic soils	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

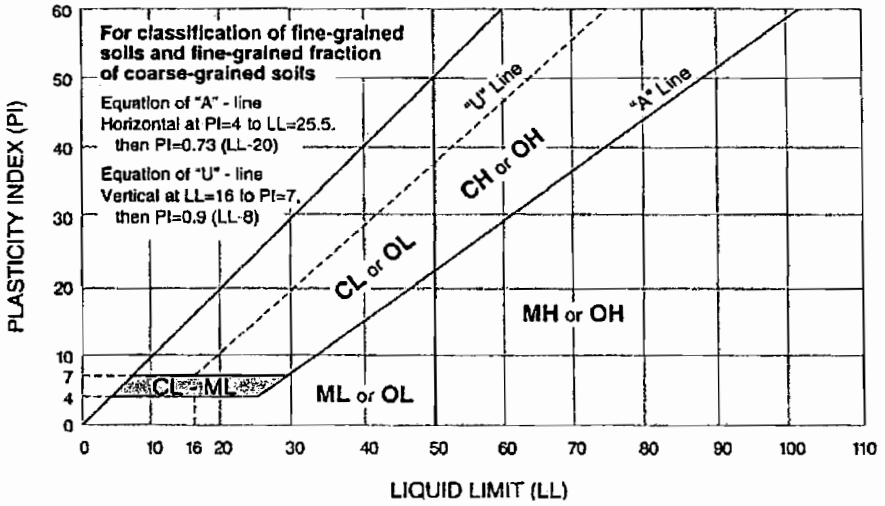
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



Terracon

Form 111—8/98

Plate A-ii

USCS SOIL TYPE (ASTM D-2487-98) & OTHER MATERIAL SYMBOLS

GROUP SYMBOL	SOIL GROUP NAMES & LEGEND	GRAPHICS
AC	ASPHALT CONCRETE	
AB	AGGREGATE BASE	
CAL	CALICHE	
CGC	CEMENTED SAND & GRAVEL	
CH	FAT CLAY	
CL	LEAN CLAY	
CL-ML	SILTY CLAY	
CONC	CONCRETE	
CONG	CONGLOMERATE	
CS	CLAYSTONE	
DOL	DOLOMITE	
FILL	MADE GROUND	
GC	CLAYEY GRAVEL	
GC-GM	SILTY CLAYEY GRAVEL	
GM	SILTY GRAVEL	
GP	POORLY-GRADED GRAVEL	
GP-GC	POORLY-GRADED GRAVEL W/ CLAY	
GP-GM	POORLY-GRADED GRAVEL W/ SILT	
GW	WELL-GRADED GRAVEL	
GW-GC	WELL-GRADED GRAVEL W/ CLAY	
GW-GM	WELL-GRADED GRAVEL W/ SILT	

GROUP SYMBOL	SOIL GROUP NAMES & LEGEND	GRAPHICS
GYPSUM	GYPSUM, ROCKSALT, ECT	
IGNEOUS	IGNEOUS ROCK	
LIM	LIMESTONE	
MH	ELASTIC SILT	
ML	SILT	
OH	HIGH PLASTICITY ORGANIC SILT OR CLAY	
OL	LOW PLASTICITY ORGANIC SILT OR CLAY	
PT	PEAT	
RHY	RHYOLITE	
SAS	SANDSTONE	
SC	CLAYEY SAND	
SC-SM	CLAYEY SILTY SAND	
SIS	SILTSTONE	
SM	SILTY SAND	
SP	POORLY-GRADED SAND	
SP-SC	POORLY-GRADED SAND W/ CLAY	
SP-SM	POORLY-GRADED SAND W/ SILT	
SW	WELL-GRADED SAND	
SW-SC	WELL-GRADED SAND W/ CLAY	
SW-SM	WELL-GRADED SAND W/ SILT	

SAMPLER SYMBOLS, LEGEND & GRAPHICS

SS	STANDARD PENETRATION TEST	
BS	BULK SAMPLE	
RS	RING SAMPLE (3" O.D.)	
PMT	PRESSURE METER TEST	
VS	VANE SHEAR	

ST	SHELBY TUBE	
PS	PISTON SAMPLER	PS
CPT	CONE PENETRATION TEST	
C	CORE	
MC	MODIFIED CALIFORNIA SAMPLER (2" O.D.)	
	NO RECOVERY	

WATER GRAPHICS

WATER LEVEL MEASUREMENT (DURING DRILLING)

WATER LEVEL MEASUREMENT (DATE)

Terracon

LOG OF BORING NO. B- 1

CLIENT: **Bright Source Energy, Inc.**

PROJECT: **Solar Power Plant**

BORING LOCATION: **See Figure 2.**

ELEVATION: **Not measured**

SITE: **Ivanpah Valley, San Bernardino County, CA**

SOIL DESCRIPTION	CONSISTENCY	GRAPHIC	USCS SYMBOL	DEPTH (FT.)	SAMPLES: SAMPLE	SAMPLES: BLOWS/FT.	SAMPLES: SMP. TYPE*	TESTS: MOISTURE %	TESTS: DRY DENSITY (pcf)	TESTS: PLASTICITY INDEX (%)
SANDY GRAVEL - with silt and cobbles, dry, light brown	medium dense		GM	1						
- occasional boulders	dense			2		57	SS			
- trace clay	very dense			3						
GRAVELLY SAND - with silt, slightly moist, brown	medium dense to dense		SM	4		22	SS			
				5						
				6						
CLAYEY SAND - with silt and gravel, slightly moist, brown	dense		SC	7						
				8						
				9		34	SS	2.3		
				10						
	very dense			11						
				12						
				13						
				14		38	SS			
				15						

Continued Next Page

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

*SAMPLE TYPES: RS = Ring BS = Bag CPT = Cone penetration test SS = Standard Penetration Test C = Core ST = Shelby Tube

NOTES: **Groundwater not encountered**

HAMMER WEIGHT (lbs): **140**

Terracon

DATE DRILLED: **6-15-07**

PROJECT NO.: **64075017**

PLATE: **A-1**

LOG OF BORING NO. B-1

CLIENT: **Bright Source Energy, Inc.**

PROJECT: **Solar Power Plant**

BORING LOCATION: **See Figure 2.**

ELEVATION: **Not measured**

SITE: **Ivanpah Valley, San Bernardino County, CA**

SOIL DESCRIPTION	CONSISTENCY	GRAPHIC	USCS SYMBOL	DEPTH (FT.)	SAMPLES: SAMPLE	SAMPLES: BLOWS/FT.	SAMPLES: SMP. TYPE*	TESTS: MOISTURE %	TESTS: DRY DENSITY (pcf)	TESTS: PLASTICITY INDEX (%)
SILTY SAND - trace clay and gravel, slightly moist, brown	very dense		SM	16						
				17						
- occasional sandy clay lenses				18						
				19		53	SS	2.3		NP
				20						
				21						
PARTIALLY CEMENTED SAND AND GRAVEL - dry to slightly moist, white to light brown	very dense to mod. hard			22						
				23						
				24		50/4"	SS			
				25						
				26						
SILTY SAND - slightly moist, brown	very dense		SM	27						
				28						
- with partially cemented lenses				29		50/5"	SS			
Continued Next Page				30						

THIS SUMMARY APPLIES ONLY AT THE LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME OR AT OTHER LOCATIONS.

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

*SAMPLE TYPES: RS = Ring BS = Bag CPT = Cone penetration test SS = Standard Penetration Test C = Core ST = Shelby Tube

NOTES: **Groundwater not encountered**

HAMMER WEIGHT (lbs): **140**

Terracon

DATE DRILLED: **6-15-07**

PAGE NUMBER: **Page 2 of 6**

PROJECT NO.: **64075017**

PLATE: **A-2**

LOG OF BORING NO. B-1

CLIENT: **Bright Source Energy, Inc.**

PROJECT: **Solar Power Plant**

BORING LOCATION: **See Figure 2.**

ELEVATION: **Not measured**

SITE: **Ivanpah Valley, San Bernardino County, CA**

SOIL DESCRIPTION	CONSISTENCY	GRAPHIC	USCS SYMBOL	DEPTH (FT.)	SAMPLES: SAMPLE	SAMPLES: BLOWS/FT.	SAMPLES: SMP. TYPE*	TESTS: MOISTURE %	TESTS: DRY DENSITY (pcf)	TESTS: PLASTICITY INDEX (%)
SILTY SAND - occasional partially cemented lenses, slightly moist, brown	very dense		SM	31						
				32						
SANDY GRAVEL - with silt and cobbles, slightly moist, brown			GM	33						
				34		50/3"	SS			
PARTIALLY CEMENTED SAND AND GRAVEL - dry to slightly moist, light brown	very dense to mod. hard			35						
				36						
				37						
				38						
				39		50/6"	SS			
				40						
SILTY SAND - trace clay and gravel, slightly moist, brown	very dense		SM	41						
				42						
				43						
				44		52	SS			
				45						

Continued Next Page

THIS SUMMARY APPLIES ONLY AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME OR AT OTHER LOCATIONS.

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

*SAMPLE TYPES: RS = Ring BS = Bag CPT = Cone penetration test SS = Standard Penetration Test C = Core ST = Shelby Tube

NOTES: **Groundwater not encountered**

HAMMER WEIGHT (lbs): **140**

Terracon

DATE DRILLED: **6-15-07**

PAGE NUMBER: **Page 3 of 6**

PROJECT NO.: **64075017**

PLATE: **A-3**

LOG OF BORING NO. B- 1

CLIENT: **Bright Source Energy, Inc.**

PROJECT: **Solar Power Plant**

BORING LOCATION: **See Figure 2.**

ELEVATION: **Not measured**

SITE: **Ivanpah Valley, San Bernardino County, CA**

SOIL DESCRIPTION	CONSISTENCY	GRAPHIC	USCS SYMBOL	DEPTH (FT.)	SAMPLES: SAMPLE	SAMPLES: BLOWS/FT.	SAMPLES: SMP. TYPE*	TESTS: MOISTURE %	TESTS: DRY DENSITY (pcf)	TESTS: PLASTICITY INDEX (%)
SILTY SAND - trace clay and gravel, slightly moist, brown	very dense		SM	46						
				47						
				48						
				49		50/4"	SS	2.0		
SANDY GRAVEL - with silt, slightly moist, brown			GM	50						
				51						
				52						
				53						
				54		50/6"	SS			
				55						
				56						
SILTY SAND - trace clay, slightly moist, brown	dense		SM	57						
				58						
				59		48	SS	2.2		NP
Continued Next Page				60						

THIS SUMMARY APPLIES ONLY AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME OR AT OTHER LOCATIONS.

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

*SAMPLE TYPES: RS = Ring BS = Bag CPT = Cone penetration test SS = Standard Penetration Test C = Core ST = Shelby Tube

NOTES: **Groundwater not encountered**

HAMMER WEIGHT (lbs): **140**

Terracon

DATE DRILLED: **6-15-07**

PAGE NUMBER: **Page 4 of 6**

PROJECT NO.: **64075017**

PLATE: **A-4**

LOG OF BORING NO. B- 1

CLIENT: **Bright Source Energy, Inc.**

PROJECT: **Solar Power Plant**

BORING LOCATION: **See Figure 2.**

ELEVATION: **Not measured**

SITE: **Ivanpah Valley, San Bernardino County, CA**

SOIL DESCRIPTION	CONSISTENCY	GRAPHIC	USCS SYMBOL	DEPTH (FT.)	SAMPLES: SAMPLE	SAMPLES: BLOWS/FT.	SAMPLES: SMP. TYPE*	TESTS: MOISTURE %	TESTS: DRY DENSITY (pcf)	TESTS: PLASTICITY INDEX (%)
SILTY SAND - trace clay, slightly moist, brown	very dense		SM	61						
				62						
				63						
SANDY GRAVEL - with silt, occasional cobbles, slightly moist, brown			GM	64		50/2"	SS			
				65						
				66						
				67						
GRAVELLY SAND - with silt, slightly moist, brown			SM	68						
				69		64	SS			
				70						
				71						
SANDY GRAVEL - with silt and cobbles, slightly moist, brown			GM	72						
				73						
SILTY SAND - with gravel, slightly moist, brown	very dense		SM	74		50/6"	SS			
				75						
Continued Next Page										

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

*SAMPLE TYPES: RS = Ring BS = Bag CPT = Cone penetration test SS = Standard Penetration Test C = Core ST = Shelby Tube

NOTES: **Groundwater not encountered**

HAMMER WEIGHT (lbs): **140**

Terracon

DATE DRILLED: **6-15-07**

PAGE NUMBER: **Page 5 of 6**

PROJECT NO.: **64075017**

PLATE: **A-5**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME OR AT OTHER LOCATIONS.

LOG OF BORING NO. B- 1

CLIENT: **Bright Source Energy, Inc.**

PROJECT: **Solar Power Plant**

BORING LOCATION: **See Figure 2.**

ELEVATION: **Not measured**

SITE: **Ivanpah Valley, San Bernardino County, CA**

SOIL DESCRIPTION	CONSISTENCY	GRAPHIC	USCS SYMBOL	DEPTH (FT.)	SAMPLES: SAMPLE	SAMPLES: BLOWS/FT.	SAMPLES: SMP. TYPE*	TESTS: MOISTURE %	TESTS: DRY DENSITY (pcf)	TESTS: PLASTICITY INDEX (%)
SILTY SAND - with gravel, slightly moist, brown	very dense		SM	76 77 78 79	☒	50/6"	SS			
Bottom Depth at Approximately 80 feet				80 81 82 83 84 85 86 87 88 89 90						

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

*SAMPLE TYPES: RS = Ring BS = Bag CPT = Cone penetration test SS = Standard Penetration Test C = Core ST = Shelby Tube

NOTES: **Groundwater not encountered**

HAMMER WEIGHT (lbs): **140**

Terracon

DATE DRILLED: **6-15-07**

PAGE NUMBER: **Page 6 of 6**

PROJECT NO.: **64075017**

PLATE: **A-6**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME OR AT OTHER LOCATIONS.

LOG OF BORING NO. B- 2

CLIENT: **Bright Source Energy, Inc.**

PROJECT: **Solar Power Plant**

BORING LOCATION: **See Figure 2.**

ELEVATION: **Not measured**

SITE: **Ivanpah Valley, San Bernardino County, CA**

SOIL DESCRIPTION	CONSISTENCY	GRAPHIC	USCS SYMBOL	DEPTH (FT.)	SAMPLES: SAMPLE	SAMPLES: BLOWS/FT.	SAMPLES: SMP. TYPE*	TESTS: MOISTURE %	TESTS: DRY DENSITY (pcf)	TESTS: PLASTICITY INDEX (%)
GRAVELLY SAND - with silt, dry, light brown	medium dense		SM	1			BS			
				2		26	SS			
CLAYEY SAND - slightly moist, brown	medium dense to dense		SC	3						
SILTY SAND - trace clay, slightly moist, brown			SM	4		21	SS			
				5						
				6						
- partially cemented	very dense to mod. hard			7						
				8						
				9		50/2"	SS			
				10						
- trace gravel and clay	very dense			11						
				12						
				13						
				14		50/3"	SS			
				15						

Continued Next Page

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME OR AT OTHER LOCATIONS.

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

*SAMPLE TYPES: RS = Ring BS = Bag CPT = Cone penetration test SS = Standard Penetration Test C = Core ST = Shelby Tube

NOTES: **Groundwater not encountered**

HAMMER WEIGHT (lbs): **140**

Terracon

DATE DRILLED: **6-15-07**

PAGE NUMBER: **Page 1 of 6**

PROJECT NO.: **64075017**

PLATE: **A-7**

LOG OF BORING NO. B-2

CLIENT: **Bright Source Energy, Inc.**

PROJECT: **Solar Power Plant**

BORING LOCATION: **See Figure 2.**

ELEVATION: **Not measured**

SITE: **Ivanpah Valley, San Bernardino County, CA**

SOIL DESCRIPTION	CONSISTENCY	GRAPHIC	USCS SYMBOL	DEPTH (FT.)	SAMPLES: SAMPLE	SAMPLES: BLOWS/FT.	SAMPLES: SMP. TYPE*	TESTS: MOISTURE %	TESTS: DRY DENSITY (pcf)	TESTS: PLASTICITY INDEX (%)
SAND - with silt, trace clay, occasional cobbles, slightly moist, brown	very dense		SW - SM	16–20		50/6"	SS			
SILTY SAND - trace clay and gravel, slightly moist, brown			SM	22–25		71	SS			
SANDY GRAVEL - with silt, trace clay, slightly moist, brown			GM	27–30		50/6"	SS	1.8		

Continued Next Page

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME OR AT OTHER LOCATIONS.

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

*SAMPLE TYPES: RS = Ring BS = Bag CPT = Cone penetration test SS = Standard Penetration Test C = Core ST = Shelby Tube

NOTES: **Groundwater not encountered**

HAMMER WEIGHT (lbs): **140**

Terracon

DATE DRILLED: **6-15-07**

PAGE NUMBER: **Page 2 of 6**

PROJECT NO.: **64075017**

PLATE: **A-8**

LOG OF BORING NO. B-2

CLIENT: **Bright Source Energy, Inc.**

PROJECT: **Solar Power Plant**

BORING LOCATION: **See Figure 2.**

ELEVATION: **Not measured**

SITE: **Ivanpah Valley, San Bernardino County, CA**

SOIL DESCRIPTION	CONSISTENCY	GRAPHIC	USCS SYMBOL	DEPTH (FT.)	SAMPLES: SAMPLE	SAMPLES: BLOWS/FT.	SAMPLES: SMP. TYPE*	TESTS: MOISTURE %	TESTS: DRY DENSITY (pcf)	TESTS: PLASTICITY INDEX (%)
SAND - with silt, gravel, and trace clay, slightly moist, brown	very dense		SW - SM	31						
				32						
				33						
				34		54	SS			
				35						
				36						
				37						
				38						
				39		48	SS	1.3		NP
				40						
				41						
SILTY SAND - with gravel, slightly moist, brown	dense to very dense		SM	42						
				43						
				44		31	SS			
				45						
Continued Next Page										

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

*SAMPLE TYPES: RS = Ring BS = Bag CPT = Cone penetration test SS = Standard Penetration Test C = Core ST = Shelby Tube

NOTES: **Groundwater not encountered**

HAMMER WEIGHT (lbs): **140**

Terracon

DATE DRILLED: **6-15-07**

PAGE NUMBER: **Page 3 of 6**

PROJECT NO.: **64075017**

PLATE: **A-9**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME OR AT OTHER LOCATIONS.

LOG OF BORING NO. B-2

CLIENT: **Bright Source Energy, Inc.**

PROJECT: **Solar Power Plant**

BORING LOCATION: **See Figure 2.**

ELEVATION: **Not measured**

SITE: **Ivanpah Valley, San Bernardino County, CA**

SOIL DESCRIPTION	CONSISTENCY	GRAPHIC	USCS SYMBOL	DEPTH (FT.)	SAMPLES: SAMPLE	SAMPLES: BLOWS/FT.	SAMPLES: SMP. TYPE*	TESTS: MOISTURE %	TESTS: DRY DENSITY (pcf)	TESTS: PLASTICITY INDEX (%)
SILTY SAND - with gravel, slightly moist, brown	dense to very dense		SM	46–47						
SANDY GRAVEL - with silt, slightly moist, brown	very dense		GM	48–49		50/6"	SS			
SILTY SAND - trace gravel, slightly moist, brown	medium dense to dense		SM	50–54		26	SS			
SANDY GRAVEL - with silt, slightly moist, brown	very dense		GM	55–59		32	SS			
Continued Next Page				60						

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME OR AT OTHER LOCATIONS.

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

*SAMPLE TYPES: RS = Ring BS = Bag CPT = Cone penetration test SS = Standard Penetration Test C = Core ST = Shelby Tube

NOTES: **Groundwater not encountered**

HAMMER WEIGHT (lbs): **140**

Terracon

DATE DRILLED: **6-15-07**

PAGE NUMBER: **Page 4 of 6**

PROJECT NO.: **64075017**

PLATE: **A-10**

LOG OF BORING NO. B- 2

CLIENT: **Bright Source Energy, Inc.**

PROJECT: **Solar Power Plant**

BORING LOCATION: **See Figure 2.**

ELEVATION: **Not measured**

SITE: **Ivanpah Valley, San Bernardino County, CA**

SOIL DESCRIPTION	CONSISTENCY	GRAPHIC	USCS SYMBOL	DEPTH (FT.)	SAMPLES: SAMPLE	SAMPLES: BLOWS/FT.	SAMPLES: SMP. TYPE*	TESTS: MOISTURE %	TESTS: DRY DENSITY (pcf)	TESTS: PLASTICITY INDEX (%)
SANDY GRAVEL - with silt, slightly moist, brown	very dense to mod. hard		GM	61						
				62						
				63						
- occasional cobbles				64		50/6"	SS			
				65						
- with cobbles				66						
				67						
				68						
				69		50/4"	SS	1.3		
				70						
				71						
SILTY SAND - trace gravel, slightly moist, brown			SM	72						
				73						
				74		50/4"	SS			
Continued Next Page				75						

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

*SAMPLE TYPES: RS = Ring BS = Bag CPT = Cone penetration test SS = Standard Penetration Test C = Core ST = Shelby Tube

NOTES: **Groundwater not encountered**

HAMMER WEIGHT (lbs): **140**

Terracon

DATE DRILLED: **6-15-07**

PAGE NUMBER: **Page 5 of 6**

PROJECT NO.: **64075017**

PLATE: **A-11**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME OR AT OTHER LOCATIONS.

LOG OF BORING NO. B- 2

CLIENT: **Bright Source Energy, Inc.**

PROJECT: **Solar Power Plant**

BORING LOCATION: **See Figure 2.**

ELEVATION: **Not measured**

SITE: **Ivanpah Valley, San Bernardino County, CA**

SOIL DESCRIPTION	CONSISTENCY	GRAPHIC	USCS SYMBOL	DEPTH (FT.)	SAMPLES: SAMPLE	SAMPLES: BLOWS/FT.	SAMPLES: SMP. TYPE*	TESTS: MOISTURE %	TESTS: DRY DENSITY (pcf)	TESTS: PLASTICITY INDEX (%)
SANDY GRAVEL - with silt, slightly moist, brown	very dense		GM	76						
				77						
SAND - with silt and trace gravel, slightly moist, brown			SW - SM	78				1.3		NP
				79		57	SS			
				80						
Bottom Depth at Approximately 80.5 feet				81						
				82						
				83						
				84						
				85						
				86						
				87						
				88						
				89						
				90						

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME OR AT OTHER LOCATIONS.

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

*SAMPLE TYPES: RS = Ring BS = Bag CPT = Cone penetration test SS = Standard Penetration Test C = Core ST = Shelby Tube

NOTES: **Groundwater not encountered**

HAMMER WEIGHT (lbs): **140**

Terracon

DATE DRILLED: **6-15-07**

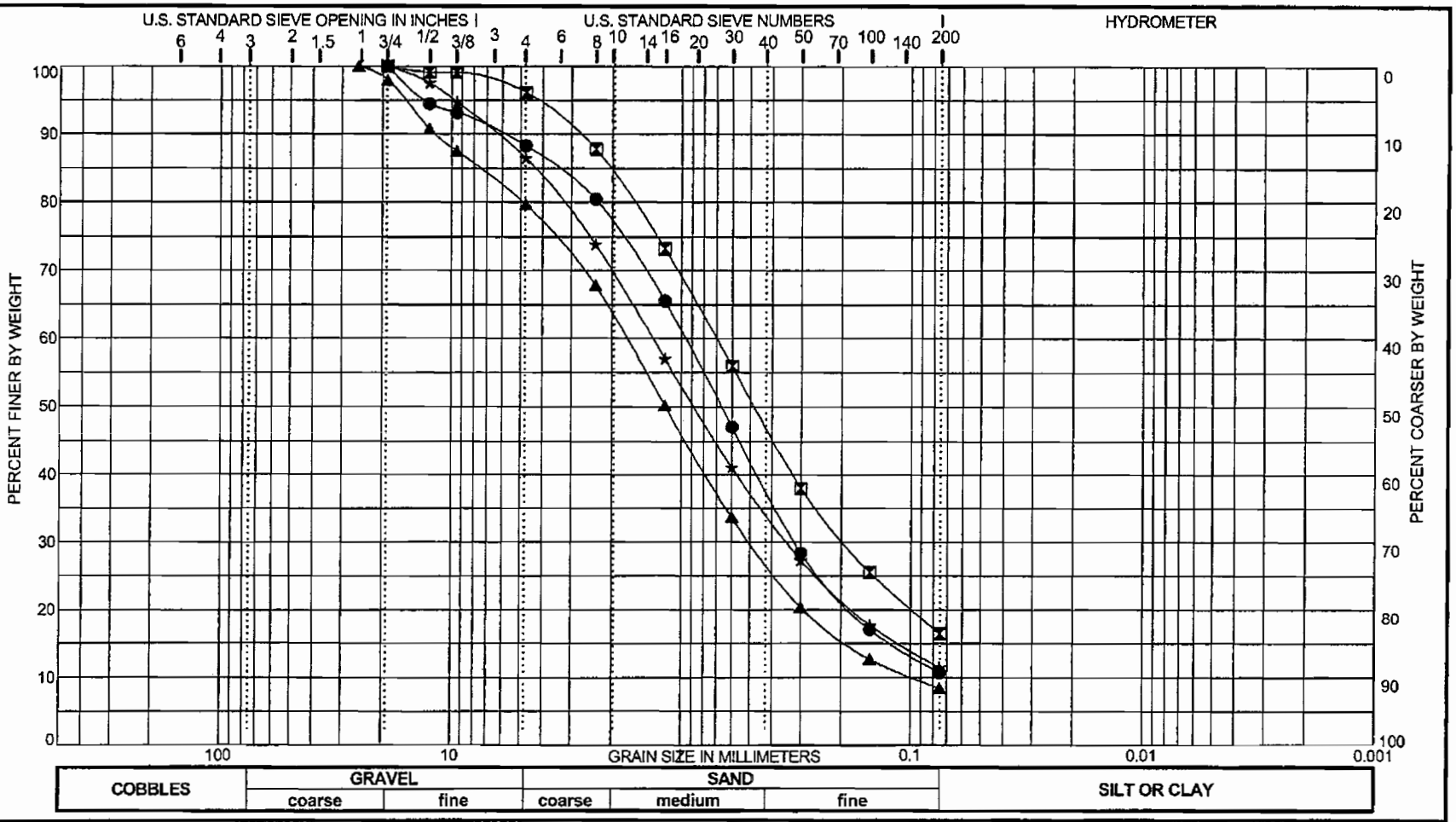
PAGE NUMBER: **Page 6 of 6**

PROJECT NO.: **64075017**

PLATE: **A-12**

APPENDIX B

Laboratory Testing



	Specimen Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	B-1	@	19.0 ft.	WELL-GRADED SAND with SILT SW-SM		NP	NP	NP	1.52	13.9
⊠	B-1	@	59.0 ft.	SILTY SAND SM		NP	NP	NP		
▲	B-2	@	39.0 ft.	WELL-GRADED SAND with SILT and GRAVEL SW-SM		NP	NP	NP	1.45	17.9
★	B-2	@	78.5 ft.	WELL-GRADED SAND with SILT SW-SM		NP	NP	NP	1.39	21.0

	Specimen Identification			D100	D85	D50	D15	%Gravel	%Sand	%Silt	%Clay
●	B-1	@	19.0 ft.	19.00	3.54	0.669	0.1200	11.7	77.6	10.7	
⊠	B-1	@	59.0 ft.	19.00	2.06	0.477		3.8	79.7	16.4	
▲	B-2	@	39.0 ft.	25.40	7.60	1.174	0.1850	20.3	71.3	8.4	
★	B-2	@	78.5 ft.	19.00	4.37	0.876	0.1110	13.5	75.0	11.5	

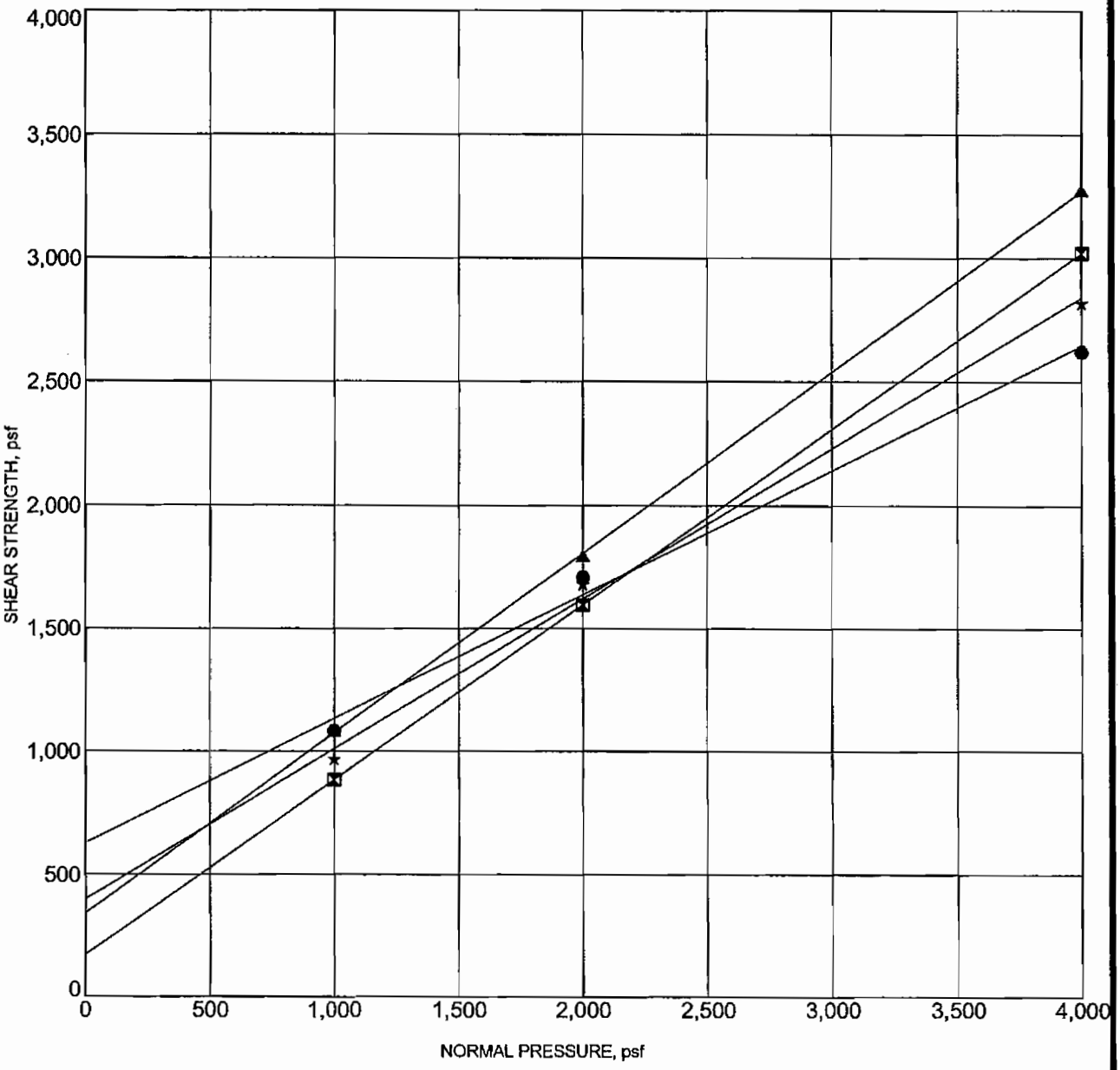
Terracon

Client: Bright Source Energy, Inc.
Project: Solar Power Plant
Project Site Ivanpah Valley, San Bernardino County, CA
Project No. 64075017

SIEVE ANALYSES

Date July 2007

B-1



Specimen Identification			Classification	c, psf	$\phi°$
●	B-1 @	14.0 ft	Clayey Sand, SC	627	27
⊠	B-1 @	54.0 ft	Sandy Gravel, GM	172	35
▲	B-2 @	34.0 ft	Sand with Silt and Gravel, SW-SM	342	36
★	B-2 @	74.0 ft	Silty Sand, SM	399	31

Terracon

DIRECT SHEAR TEST

Client: Bright Source Energy, Inc.
Project: Solar Power Plant
Site: Ivanpah Valley, San Bernardino County, CA
Job #: 64075017

PLATE: B-2

TC_DIRECT_SHEAR_DEB 75017.GPJ TERRACON.GDT 7/2/07

Atlas Consultants, Inc.

6000 S. Eastern Avenue, Suite 10J • Las Vegas, Nevada 89119
(702) 383-1199 • Fax (702) 383-4983

member of
AMERICAN SOCIETY FOR
TESTING MATERIALS

ACT LAB NO: 14475(c) **DATE:** June 21, 2007

PROJECT NO: 64075017 **P.O.:**

ANALYZED BY: Kurt D. Ergun **LAB ID:**

REPORT OF DETERMINATION

AWWA 4500 E

SOIL SIEVE SIZE = -10 MESH

Sample No.	Location	Depth (Feet)	Water Soluble Sulfate (SO_4) in soil Percent By Weight
	B-1	9.0	0.02
	B-2	29.0	0.02

Robert L. Simmons

LABORATORY MANAGER

Notes: The results for each constituent denote the percentage of that analyte, at a 1:5 (soil:water) extraction ratio, which is present in the soil.

PLATE: B-3

Soil and Water Resources (133-145)

BACKGROUND

Groundwater in the Ivanpah basin is regulated under a San Bernardino County ordinance and federal right-of-way grants have been approved where wells are located on public lands. The Primm Valley Golf Course has historically produced an estimated average 1827 acre-feet/year, principally from two wells known as Colosseum #1 and #2. Colosseum #1 is located in the NW¼SW¼ of Section 35, T. 17 N., R. 14 E. Colosseum #2 is located in the NW¼NW¼ of Section 2, T. 16 N., R. 14 E. Proposed monitoring well locations have been authorized by BLM through issuance of right-of-way grants. There is some question if monitoring wells have been constructed but none the less, they are a valid existing authorization that must be recognized by construction plans proposed by the applicant.

The applicant has proposed the installation of two water wells in the SE¼ of Section 34, T.17 N., R. 14 E., less that one half mile from the Colosseum wells and within the proposed monitoring well pattern. BLM believes that the ISEGS proposed well locations would interfere with monitoring and regulation of the Colosseum wells. In addition, the increased cumulative drawdown effect of the two existing and two proposed water production wells could accelerate deformation of the brackish water interface surrounding the playa. This cumulative effect could lead to a more rapid interception of the brackish water interface with resulting decrease in water quality. Three Primm Valley Golf course water wells located in Section 36 approximately 1 mile east of the Colosseum wells currently produce only about 12 Acre-feet/year due to substantially lower water quality (2-3 times higher total dissolved solids (TDS)).

Two water wells (WP5 & WP6) located approximately three miles due north of the Colosseum wells (NW¼SW¼ Section 14 and NW¼SW¼ Section 23, respectively) are authorized under federal ROW grants and permits issued by San Bernardino County. These wells provide municipal water for Primm, NV, and are permitted for 751 acre-feet/year. The Molycorp water wells located to the southeast have averaged approximately 800-1000 acre-feet/year with highest production rates at about 1200 acre-feet /year. Under California water law, Molycorp has probably established a water right of at least 1000, and perhaps 1200, acre-feet per year.

DATA REQUEST

133. Please provide alternate proposed locations for water wells that will minimize impacts on existing water wells.

Response: Drawing IVAN-0-DW-048-111-001 (i.e., Drawing 1 of 7), shows the proposed location of the project's proposed water supply wells.

134. Please revise any analyses that assume a future Molycorp water production rate of 420 acre-feet/year using a more realistic figure of at least 1000 acre-feet/year.

Response: In 2003, the County of San Bernardino prepared an Environmental Impact Report (EIR) for the continued mining and mineral recovery operations of the Molycorp's Mountain Pass Mine facility (now owned by Chevron) for the next 30 years (Mountain Pass Mine EIR; County of San Bernardino 2003). As described in the Mountain Pass Mine EIR, Molycorp obtains its water supply from two different sources, groundwater from the Shadow Valley, 12 miles north of the mine site, and groundwater from the Ivanpah Valley. Water from both well fields is blended to reduce the naturally high fluoride content of water from the Ivanpah Valley. As described in the Mountain Pass Mine EIR, water production from both well fields in 1996 was 1,388 acre-feet. The average annual use at the Mountain Pass Mine from 1993 to 1997 was 1,280 acre-feet per year (ac-ft/yr). Total water production from the Shadow Valley well field in 1996 was approximately 818 acre-feet. Total water production from the Shadow Valley well field from 1991 to 1997 ranged from 466 to 885 ac-ft/yr. Total water production from the Ivanpah Valley well field in 1996 was 570 acre-feet, and ranged from 503 to 630 ac-ft/yr from 1991 to 1997. As described in the Mountain Pass Mine EIR, the Shadow Valley well field has provided between 44 to 59 percent of the total water supply for the Mountain Pass Mine, and the Ivanpah Valley well field has provided between 41 and 56 percent of the total water supply.

Planned water use for the re-operation of the Mountain Pass Mine is estimated to be about 847 ac-ft/yr (County of San Bernardino 2003). This is about 433 ac-ft/yr or about 30 percent less than the average annual use at the mine from 1993 to 1997 (1,280 aft/yr) and about 517 ac-ft/yr or about 38 percent less than the amount used in 1996 (1,364 acre-feet). Molycorp plans to achieve this reduction in water use by increasing water recycling and reuse at the mine site. As described in the Mountain Pass Mine EIR, "Molycorp has indicated that the relative percentages of water used from the Ivanpah Valley and Shadow Valley will likely stay as it has been in the recent past to deal with the elevated fluoride content in the water produced from the Ivanpah Valley wells" (County of San Bernardino 2003). Thus, assuming that future water use for the re-operation of the Mountain Pass Mine is estimated to be about 847 ac-ft/yr, Molycorp anticipates using approximately 347 to 474 ac-ft/yr from the Ivanpah Valley (between 41 and 56 percent of the total water supply). For the purposes of the analysis in the AFC, it was assumed that Molycorp would use an average of approximately 420 ac-ft/yr from the Ivanpah Groundwater Basin. This value is within the range of anticipated use as described in the Mountain Pass Mine EIR (County of San Bernardino 2003).

Although the Background discussion for this data request states that Molycorp's Ivanpah Valley well field has averaged approximately 800 to 1,000 ac-ft/yr with highest production rates at about 1,200 ac-ft/yr, based on the Mountain Pass Mine EIR, total water production from both Molycorp's Ivanpah Valley well field and the Shadow Valley well field have historically been in this range. However, this water is being extracted from two different groundwater basins and only 41 and 56 percent of the total water production has come from the Ivanpah Groundwater Basin (County of San Bernardino 2003). Additionally, under California water law, groundwater rights are

established in a court adjudication process, and historical extraction of percolated groundwater does not establish a right to this water. The Ivanpah Valley Groundwater Basin is not an adjudicated basin.[1]

Although it is unlikely that Molycorp will increase its groundwater extraction from the Ivanpah Groundwater Basin to 1,000 ac-ft/yr, an analysis has been completed assuming this extraction amount. The analysis consists of comparing the total pumping within Ivanpah Valley to the recharge within the valley. As shown in Table 5.2 in the report "Ivanpah Solar Electric Generation Station, Groundwater Availability, Ivanpah Valley, California", August 2007 (AFC, Appendix 5.15C), the recharge to the Ivanpah Valley Groundwater Basin is 8,100 ac-ft/yr. Including the ISEGS pumping of 100 acre-ft/yr, assumed Molycorp pumping of 1,000 ac-ft/yr, and other existing pumping of 4,300 ac-ft/yr, the total pumping within Ivanpah Valley Groundwater Basin would be 5,400 ac-ft/yr. Correspondingly, the recharge exceeds the pumping, even if the Molycorp pumping were to be 1,000 ac-ft/yr.

135. Please discuss the cumulative impact to groundwater physically and chemically by all groundwater users in the project vicinity.

Response: The physical cumulative impact to groundwater was discussed in AFC Section 5.15.5 on page 5.15-20 and 5.15-21 and in AFC Appendix 5.15C. Additional information on the cumulative impact to groundwater was provided in Data Responses 77 and 78, Set 1A.

For the reasons discussed in these materials and below, no significant cumulative impact to groundwater, physically or chemically, will occur as a result of the project

The project groundwater wells will be located on the western margin of the Ivanpah Valley Groundwater Basin where groundwater quality is generally better. Groundwater extractions at the project wells would result in a cone of depression and "pull" more saline groundwater from areas to the east (the valley axis). However, because the project pumping is small, the project is expected to result in only negligible changes to groundwater quality. For example, and as described in Data Response 73 (Set 1A), an analysis was conducted to determine the rate of induced groundwater movement (gradient and velocity) that would result from the Ivanpah SEGS at both the old and new Molycorp evaporation ponds. This analysis was conducted using the WTAQ model (Barlow and Moench, 1999). Rates of induced groundwater movement were shown in Figure DR73-1 for the old Molycorp Evaporation Ponds and Figure DR73-2 for the new Molycorp Evaporation Ponds. As shown in these figures, the project would result in minor changes to the groundwater gradient and groundwater velocity at both the old and new Molycorp evaporation ponds. These changes would result in a negligible migration of groundwater under the evaporation ponds as a result of the project. Because the project would result in negligible impacts to groundwater quality, it would not cause or contribute to a significant cumulative groundwater quality impact.

[1] The Background Section of this data request states, "...Molycorp has probably established a water right...." To the extent this suggests a legal conclusion, Applicant respectfully notes that it does not necessarily agree; however, fortunately, such legal issues are irrelevant to the informational issues associated with this data request and Applicant's response.

BACKGROUND

Data request #7 states, in part: "Please provide a description of the facility maintenance activities, including but not limited to" The January 14 response did not completely address the requested data. These concerns are not necessarily related as much to an air quality issue as they are the project design and long term maintenance requirements for the project. Water from bi-monthly washing will likely promote vegetation growth, particularly for noxious and invasive species. BLM does not believe it is reasonable to assume that tractor/trailer pulling for heliostat washing over the 50 (or more) year life of the facility will eliminate the need for vegetation suppression. It is also not reasonable to assume that there will be no need for grading or maintenance access routes as part of an ongoing maintenance plan for the facility. Tractor and wash trailer routes will require some level of maintenance over the term of an authorization. In the sandy soils across the project area, BLM is concerned about the need for surfactants for dust suppression and stabilization of these routes.

DATA REQUEST

136. Provide a discussion of long term facility maintenance requirements that address cleaning heliostats, vegetation suppression including treatment of noxious and invasive species, long term maintenance requirements on access routes, reapplication of dust suppression on all disturbed surfaces that receive repeated use, and the expected number and size of the fleet of maintenance equipment that will be used for all maintenance activities in the facility.

Response:

Solar Field Maintenance includes the following:

- Washing – We expect to wash every heliostat once every 2 weeks. We can wash about 100 per hour. It means 4 trucks working 10 hours every night, traveling on a route at about 0.4 mile per hour.
- Mirrors change – we expect 0.1 percent breakage per year. The broken mirrors will be changed once per year. This would require one truck coming to the site and working one day.
- Mechanical/Electrical/I&C repairs on heliostats – We assume this will occur once per day, which translates into one pick-up driving 2 miles.
- Security – We assume guards will make 2-3 rounds per day = one pick-up driving 5-7 miles.

Vegetation Suppression includes the following:

Although the Applicant does not think that sufficient water will drain from the mirrors that are washed to cause new plant growth, if such growth occurs, native plants will be allowed to grow so long as their growth does not interfere with the operation of the heliostats, or their maintenance. If noxious or invasive weed species grow, they will be eradicated by using an approved herbicide.

Dust Suppression includes the following:

The Applicant is not proposing to use dust suppression during operations. Most operational traffic will occur on paved roads (e.g., vehicles traveling to and from the administration/storage building). Washing of heliostats will be done by farm tractors pulling a water tanker. The vehicles will be moving less than 5 mph; therefore, dust suppression would not be needed. Of course, the Applicant has every incentive to minimize dust creation since dust's effects on the mirrors is the primary reasons for mirror washing in the first place.

BACKGROUND

The heliostat washing results in nearly all groundwater produced dripping onto the ground and thereafter evaporating into the atmosphere. At first the increased water would likely promote plant growth which will include weeds. We are also concerned about the weed control program and that it include an approved herbicide treatment, which could be mobilized by heliostat wash water.

Through time as that water evaporates salts are left behind which will ultimately result in reduced permeability and reduced ability of the soils to support vegetation particularly post-project. ISEGS has also identified that chemicals will be added during the de-ionization process to prevent scaling and corrosion.

DATA REQUEST

137. What will be the chemical constituents and concentrations of water used to wash heliostats? Discuss and quantify the buildup of these constituents in the soils through the life of the project and how the impact would be mitigated and the lands eventually reclaimed and rehabilitated.

Response: Water will be deionized (DI) prior to its use for heliostat washing. Caustic injection and sulfuric acid injection for pH control and antiscalant injection for the deionized or demineralized treatment plant will be used to maintain water treatment conditions in the reverse osmosis (RO) system. The RO system will reduce minerals substantially and then the mixed bed ion exchange polisher unit downstream of the RO unit will further reduce mineral content to the water quality indicated in Table DR137-1. There will be negligible trace quantities of sodium or antiscalant below the concentrations listed below. Heliostat washing will occur at night, at a rate of 2.5 gallons per heliostat, and at 2-week intervals. A "worst-case scenario" of wash water quality is provided in Table DR137-1, below, along with the estimated loading of each constituent over the 50-year life of the project. Total soil buildup of these constituents over the life of the project will be negligible (Table DR137-1). Note also that concentrations of copper and iron in the wash water are well below drinking water MCLs for those constituents (1000 and 300 µL for copper and iron, respectively).

The amount of wash water that is expected to infiltrate the soil during washing is also minimal (0.005 inch across the site). With washing occurring at 2-week intervals, all wash water is expected to evaporate, leaving little if any water available for weed establishment or plant growth. (For comparison, annual pan evaporation in the Mojave

is about 100 inches.) Evaporation will leave a minimal amount of residual salt accumulation, which would be translocated downward through the soil profile or be transported with runoff during winter rains. The wash water is not expected to have an adverse effect on soil permeability, since sodium concentrations are negligible.

Using the water sources and the management practices described above, no adverse impacts will result from heliostat wash water.

TABLE DR137-1
Estimated Wash Water Quality and 50-Year Buildup

Constituent	Concentration	Estimated 50-year buildup (lbs/acre)
Hardness as $CaCO_3$	0.005 mg/L	0.008
Copper	0.01 mg/L	0.016
Iron	0.03 mg/L	0.048
Silica	0.3 mg/L	0.483
Conductivity	<1 µS/cm (<.001 dS/m)	
pH	8.5	

TABLE DR137-2
Estimated Wash Water Volume and Depth per Application

Location	Number of Heliostats	Site Area (acres)	Wash Water Amount (gallons per wash event)	Wash Water Amount (acre inch per wash event)	Wash Water Depth for Site (inches per wash event)
Ivanpah 1	55,000	914	137,500	5.06	0.006
Ivanpah 2	55,000	914	137,500	5.06	0.006
Ivanpah 3	104,000	1,768	260,000	9.57	0.005
Total	214,000	3,596	535,000	19.70	0.005

138. Please discuss heliostat wash water in terms of a waste stream.

Response: Heliostat wash water is not a waste stream. The DI water will be used to wash the mirrors with most of the water draining to the ground under the heliostat where it will be absorbed into the surface soil and evaporate as described in Data Response 137.

BACKGROUND

In the Mojave Desert, rainfall usually occurs during brief but intense storms. An average of three inches per year of rainfall can be expected at the project site. The water that does not infiltrate into the ground or evapotranspire flows as surface runoff and at times can result in flash flood conditions. Conditions at the site indicate past surface flows have had enough energy to transport gravel and cobbles across the project site. The

plants on the grade of the bajada (coalescing alluvial fans), on which the project is proposed, help retain sediment and reduce erosion potential from runoff. Removing all the vegetation to the root system would dramatically alter the surface runoff pattern that has naturally developed and likely allow transport and deposition of coarser material on distal portions of the fan and ultimately the Ivanpah Dry Lake bed. At such a large scale, up to 3,400 acres of vegetation removal and ground disturbance, management of the surface water flows will require extensive engineering. The project applicant has already stated they would supply a final grading plan.

DATA REQUEST

139. As part of the final grading plan, please describe in detail, using illustrations and written descriptions as necessary, the following:

    a. How sheet and channel flow across the project site, over roads, around the heliostats, and off the site would be managed through engineering controls.

Response: As stated in Applicant's May 29, 2008 letter, an additional 30 days has been requested to respond to this data request. All stormwater engineering controls such as detention ponds, diversions channels, culverts, etc. are to be designed to control the 100-year, 24-hour storm event. All calculations will be provided.

    b. Calculations showing the stormwater engineered controls have sufficient capacity for a 100-year, 24-hour storm event.

Response: As stated in Applicant's May 29, 2008 letter, an additional 30 days has been requested to respond to this data request. All stormwater engineering controls such as detention ponds, diversions channels, culverts, etc. are to be designed to control the 100-year, 24-hour storm event. All calculations will be provided.

    c. Erosion and deposition predictions on the up-slope and down-slope sides of the projects.

Response: As stated in Applicant's May 29, 2008 letter, an additional 30 days has been requested to respond to this data request.

    d. Please describe the engineering controls in the event of a hazardous or non-hazardous spill.

Response: In the case of an event, hazardous and non-hazardous spills shall be handled in accordance with all local, state and Federal regulations. Engineering controls for the Ivanpah SEGS will include such items as containment dikes and berms around oil storage and oil-bearing equipment, double-wall piping (as required), sand bags and use of spill prevention kits, as needed. Such controls will be described in a Spill Prevention, Containment and Countermeasures (SPCCP) Plan

    e. Please explain in writing and with illustrations how the principles of Low Impact Development would be integrated into the final grading plan.

Response: As stated in Applicant's May 29, 2008 letter, an additional 30 days has been requested to respond to this data request.

BACKGROUND

Some elements of Data Request 58, the Drainage Erosion and Sediment Control Plan (DESCP), were not answered.

DATA REQUEST

140. Please provide a final DESCP with all elements answered, including those itemized below.

a. Typical best management practices (BMPs) were provided in the draft DESCP. Due to the size of the project site, site-specific BMPs for both the construction and operation phases need to be identified on topographic maps for all areas except the power block area where BMPs have already been identified on topographic maps. Please provide these site-specific BMPs for the construction and operation phases.

Response: As stated in Applicant's May 29, 2008 letter, an additional 30 days has been requested to respond to this data request.

b. In Section 4.0 of the draft DESCP, a timing and maintenance schedule was provided, but only a general level of detail. A detailed schedule of the timing of the BMPs to be employed and a maintenance schedule for all BMPs needs to be provided for each phase of the project construction and operation. Please provide this detailed schedule.

Response: As stated in Applicant's May 29, 2008 letter, an additional 30 days has been requested to respond to this data request.

c. Page 9 of the draft DESCP mentions that concrete holding basins would be used for the discharge of water (if uncontaminated) used for hydrostatic testing of the natural gas pipeline.

i. Where would these basins be located?

Response: As shown in AFC Figure 2.2-1b (Ivanpah 1), Figure 2.2-2b (Ivanpah 2) and Figure 2.2-3b (Ivanpah 3), they would be located in the power block. (See item 15 in each of those drawings). Additional information on the holding basins can be found in Data Response 112, Set 1A.

ii. What would be the size of the basins?

Response: As noted in AFC Section 2.2.7.4.4, the basins will be approximately 40 feet by 60 feet.

iii. Please provide supporting calculations that show the size of the basins is sufficient to contain the potential volume of water that could be discharged (up to 400,000 gallons).

Response: Based on preliminary design information the basins at each power block have been sized to contain about 200,000 gallons of water. To do so, the size of each basin would be

40′ x 60′ x 6′. (40′ x 60′ x 6′ = 14,400 sq. ft = ~107,700 gallons). This size is sufficient to hold the following:

- Pressure test water—6-inch gas pipe line from the Kern River Gas Line tap point to the Ivanpah 1 power block (~47,000 gallons)
- Water in the Solar Tower (~20,000 gallons)
- Water inside the power block (~100,000 gallons), which includes the following systems:
  - Feedwater System
  - Condensate Water System
  - High Pressure Steam Piping
  - Demineralized Water System

During final design, if additional holding capacity is needed, the basins can either be enlarged or deepened.

d Page 10 of the draft DESCP, Table 3.4-1, cut volumes of soil are greater than the fill volumes. The text states that there will be no soil exported offsite. This apparent difference needs to be reconciled and explained.

Response: As stated in Applicant's May 29, 2008 letter, an additional 30 days has been requested to respond to this data request.

e. Page 17 of the draft DESCP states that there will be a concrete washout area used during construction. The location and size of this washout area need to be shown on a map of the project site and discussed in the text.

Response: As stated in Applicant's May 29, 2008 letter, an additional 30 days has been requested to respond to this data request.

f. Figure 3-9 of the draft DESCP has errors in the form of seemingly random lines on the figure. It appears to be the result of a printing malfunction or error in the graphic computer file. Please correct this figure.

Response: A revised printout of Figure 3-9 is provided at the end of this section.

BACKGROUND

A Federal Clean Water Act section 401 certification may be required. If there are potential impacts to surface waters (perennial or ephemeral) of the State and/or Waters of the United States, such as drainages, streams, washes, ponds, pools, or wetlands, this certification will be required by the Central Valley, Regional Water Quality Control Board (RWQCB).

DATA REQUEST

141. Please discuss in detail whether 401 certification would be required.

Response: See Data Response 142.

142. If 401 certification would be required, please discuss compliance with the 401 certification requirement and include a copy of the 401 application and a schedule for completion of the certification.

Response: A draft wetland delineation report was submitted on February 12 2008 to Shannon Pankratz at the U.S. Army Corps of Engineers (USACE), Regulatory Division, Los Angeles Office. Copies of the draft report were also submitted to Mary Dellavalle at the Lahontan District of the Regional Water Quality Control Board (RWQCB) on April 30, 2008 and Becky Jones at California Department of Fish and Game (CDFG) on March 19, 2008.

Preliminary discussions with Shannon Pankratz of the USACE regarding jurisdiction over the washes at Ivanpah SEGS occurred on May 20, 2008. A tentative meeting to review and discuss the washes in the field was to occur on May 22, 2008, but the USACE was unable to attend and the meeting was cancelled.

The USACE, during preliminary discussions with Russell Huddleston/CH2M HILL, stated that the Ivanpah Dry Lake outside the project area is under the jurisdiction of the USACE, but that the washes within the Ivanpah SEGS project would not likely be considered tributary waters of the U.S. However, following the *Rapanos* court decision on tributary waters of the U.S., all jurisdictional tributary waters determinations must be elevated by the USACE to the U.S. Environmental Protection Agency (USEPA).

Concurrently, additional data on washes identified within small project areas that were not included in the project limits in 2007 is being prepared. This additional information will be submitted in a supplemental letter format for USACE, RWQCB, and CDFG review.

Per our latest email correspondence, Shannon Pankratz/USACE is planning to review the wetland delineation report the week of June 16th. Once she has made a jurisdictional determination, the jurisdictional determination must then go through the USEPA review process. The USEPA review process is expected to take a minimum of 21 days after the USACE has made its determination.

A meeting is being set up so that CDFG Streambed Alteration Agreement information requirements can be discussed with Ms. Becky Jones/CDFG the week of June 9, 2008.

Ms. Mary Dellavalle/RWQCB will also be consulted the week of June 9 to determine if she has been able to review the draft wetland delineation report and discuss the Section 401 Certification requirements for the project.

BACKGROUND

Sinkholes are present in the Ivanpah Dry Lake bed both north and south of Interstate 15. The reason for the formation of these sinkholes is under investigation. The sinkholes may be developing due to regional subsidence occurring as a result of groundwater extraction or possibly due to chemical dissolution.

DATA REQUEST

143. Please discuss whether the project is designed to account for the possibility of sinkholes developing in the project area.

Response: The Ivanpah SEGS power towers and power block areas will be analyzed for the presence of sink holes through the use of soil borings until "refusal" by a licensed Geotechnical Engineering firm. (Note: refusal is defined as when the drilling bit ceases to advance due to the presence of solid material such as bed rock). The heliostat field design and layout will not account for the possibility of sinkholes due to the large number of heliostats and the relatively small cost associated with heliostat replacement.

144. If the project is designed for the possibility of sinkholes developing in the project area, please discuss this design in detail.

Response: As discussed in Data Response 143 above, the Ivanpah SEGS power towers and power block areas will be analyzed for the presence of sink holes through the use of soil borings by a licensed Geotechnical Engineering firm. In addition, the Geotechnical Engineering firm will analyze the onsite soil conditions and provide recommendations regarding the required footing and foundation designs should sinkholes be discovered.

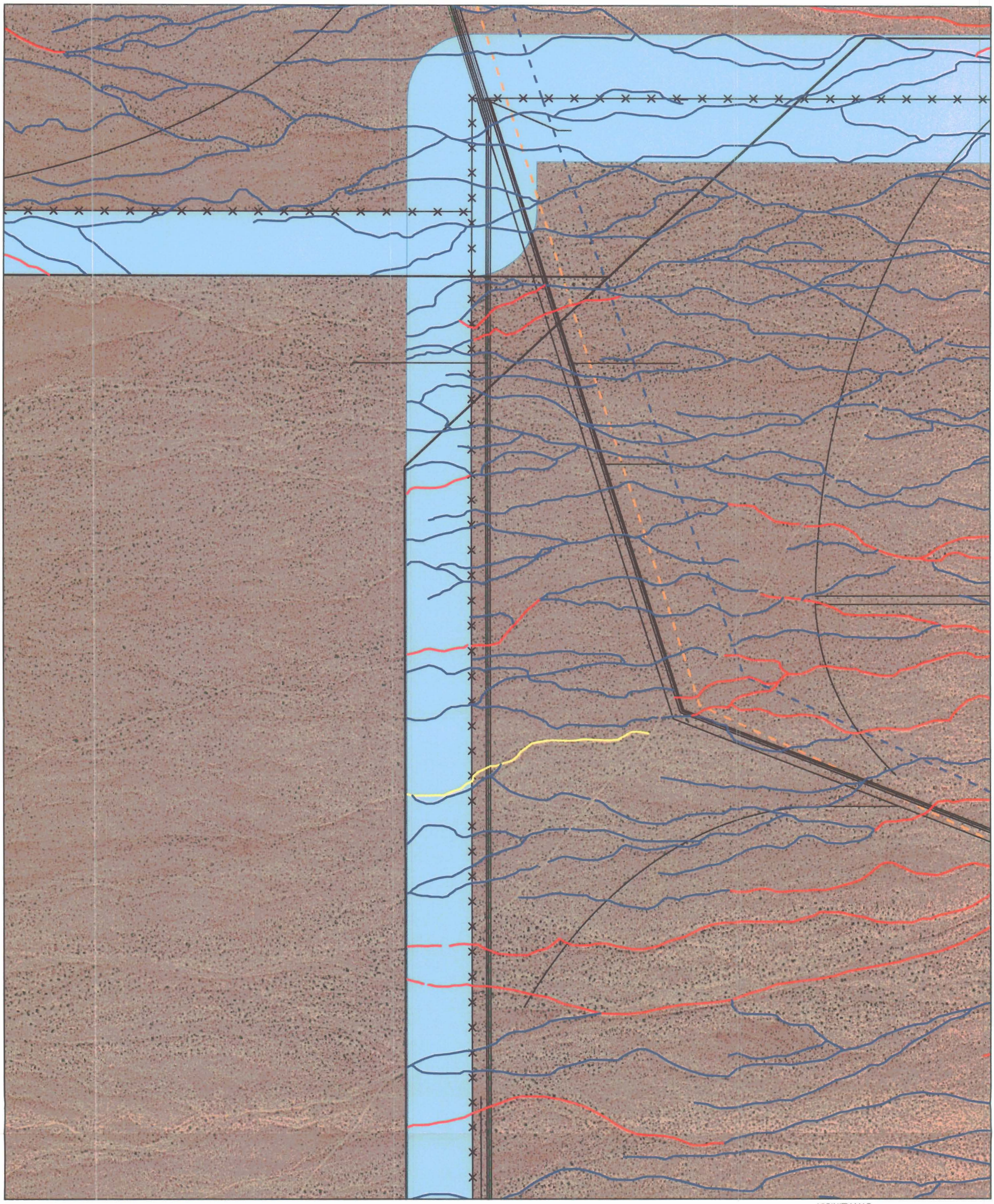
BACKGROUND

In response to Data Requests 63, the applicant provided a map of proposed stockpile locations to be used during construction. The stockpile locations for storing cut soil seem too small given the size of the project and the expected volume of soil and vegetation expected to be generated.

DATA REQUEST

145. Please provide calculations supporting that the size of the stockpile locations are sufficient to support the volume of soil and vegetation expected to be generated.

Response: The location and area of each unit soil stockpile was provided to indicate a temporary location where cut material will be stored prior to reuse as fill within the site. Each unit's stock pile area will be conservatively sized to support the worse case scenario and will be protected by approved BMP's to minimize erosion. Calculations used to determine the size of each stockpile will be provided.



LEGEND

(CATEGORY) WIDTH

- (1) 10 FEET OR MORE
- (2) 5 TO 10 FEET
- (3) 1 TO 4 FEET

- PROPOSED PROJECT SITE
- BUFFERS
- NEW WELL LOCATION
- PROPOSED GAS LINE
- PROPOSED TRANSMISSION LINES
- EXISTING TRANSMISSION LINE CORRIDOR
- PROPOSED WATER LINES
- REROUTED COLOSSEUM ROAD
- PAVED ROADS
- DIRT ROADS

0 380 760
Feet

N

VICINITY MAP

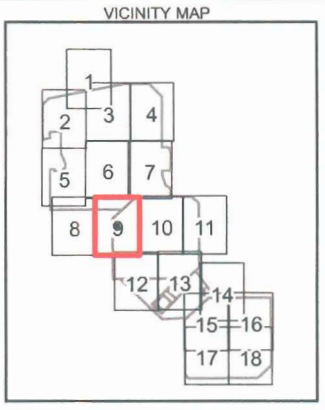


FIGURE 3-9
Sheet 9 of 18
Ephemeral Washes Map
Ivanpah Solar Generating System

Visual Resources (146-151)

BACKGROUND

In response to Data Request (DR) 105, requesting information on frequency, duration, or intensity of anticipated dust reflection of sunlight, applicant stated that no modeling was performed, and that no model for this purpose had been identified.

The applicant was diligent in identifying and representing the effect of sunlight reflected by ambient dust in the simulations in the AFC. Staff assumes that the condition depicted in those is a worst-case scenario. Staff also appreciates the difficulty involved in attempting to quantify this effect. Nevertheless, it is very difficult for anyone to truly understand or adequately evaluate the potential visual effects of the project without some better understanding of the likely frequency and brightness of this effect.

Applicant's response refers to DR 90, which addresses potential issues of safety with regard to the dust-created glare. The concern of DR 105 however was not only safety, but also visual prominence and potential impact on motorists and recreationists in the viewshed. Reflected glare from airborne dust could presumably be among the most substantial visual impacts of the project – more than visual prominence of the solar collector towers. Without additional information from other past projects, however, this impact remains an essentially unknown effect, and staff lacks an adequate means to evaluate potential visibility and impact of the project. Staff believes some observations from past projects must be available, however.

Again, the concern in this request is not safety, but rather characterization of visual prominence, frequency of visibility, etc. for purposes of evaluating potential visual impact to motorists, recreationists, and other sensitive visual receptors.

DATA REQUEST

146. Please provide additional information, evidence or observations from other past or present projects utilizing the same technology, on frequency, brightness, duration of dust-reflected glare, including:

    a. anecdotal information or evidence on frequency, duration and intensity of dust-reflected glare from other past or present projects, including the Solar 1 experimental project, or projects in other countries

Response: We have researched this question in the published records and analyses of Solar One and Solar Two. Despite the diligence of our research, we have been unable to locate any such references. We have provided, however, the most important study of tower-related glare by T. D. Brumleve, "10 MWe Solar Thermal Central Receiver Pilot Plant: Beam Safety Tests and Analyses", SAND83-8035, 1984, as Attachment DR89-1 (Data Response, Set 1A), and in which no mention is made of the secondary phenomenon of sunlight reflecting from dust particles.

As is indicated in the Background section of this Data Response, the expected reflection of the dust particles is depicted in the visual simulations that have been prepared for the project. It has been our experience that on sunny dusty days, light is absorbed and muted by dust particles. On sunny non-dusty (i.e., clear) days, reflection of dust particles would not likely occur due to the lack of dust. Reflection of dust particles could occur on sunny moderately dusty days.

During overcast (i.e., cloudy) weather or when the sun is low on either horizon, sunlight is not expected to noticeably reflect off suspended dust particles, so that dust reflection would be less than depicted in the visual simulations. The number of days per year that there would be cloudy weather (i.e., times when the project would not operate, and therefore, no dust reflection) in the project area was estimated using historical weather records for the 89019 zip code from Weather Underground (http://www.wunderground.com). Over the course of a year, approximately 38 days (10.4 percent) are expected to be cloudy, with no expected dust reflection.

b. photographic documentation of this effect from such projects

Response: Photographs of the Solucar PS-10 plant in Seville, Spain, demonstrating dust reflection of sunlight, are available on the internet, see for example, http://commons.wikimedia.org/wiki/Image:PS10_solar_power_tower_2.jpg or http://www.inhabitat.com/2007/05/21/sevilles-solar-power-tower/. These photos were provided in AFC Volume 2, Appendix 5.13. The Applicant has no additional photos of a solar plant's reflection of sunlight on dust particles..

The reflection of sunlight on dust particles and water vapor can clearly be seen in the photos provided. What cannot be seen in these photos is the glare of light reflected from the receiver itself, because the PS-10 plant uses a 'cavity' receiver that cannot be seen from this photographic perspective, but can be seen in the BBC presentation found at: http://www.youtube.com/watch?v=0Okq]w1oTMk. A CNN report can also be found on YouTube at: http://www.youtube.com/watch?v=Q9vkkFNkE44&feature=related.

The PS-10 photographs show diffuse reflection of light on both dust and vapor particles. The prevailing climatic conditions in the region of Ivanpah 1 indicate much lower levels of relative humidity than at the Seville, Spain site, and therefore, lower levels of atmospheric water vapor can be expected at this Mojave Desert site. No additional information is available as to the relative levels of airborne dust at the two sites.

Additional photographic information can be found by searching YouTube, Flickr, and Google for topics such as: PS-10 Solar Thermal, Seville Solar, Solucar, Concentrating Solar Power, and Solar Power Tower.

Links to some of the photos of the Solucar PS-10 plant on Flickr are provided below:

http://www.flickr.com/photos/19349168@N07/2282379175/
http://www.flickr.com/photos/15711097@N07/2432979454/
http://www.flickr.com/photos/afloresm/1448540890/
http://www.flickr.com/photos/jacoboportillo/2220738643/
http://www.flickr.com/photos/canalsjo/1172230642/

c. expert testimony on this phenomenon with respect to the proposed project technology, if available

Response: The Applicant is not aware of people who are experts on the reflection of sunlight on dust particles. A search of publicly available data sources identified a few possible researchers on the topic of light scattering, but has identified no research on light scattering at a solar power tower.

BACKGROUND

CEC and BLM staff continue to be concerned about potential visual effects to recreational visitors within the project viewshed, which includes the Ivanpah dry lakebed, Joshua Tree Highway, and heavily used recreational destinations within the Mojave National Preserve. BLM staff have identified a list of sensitive recreational key points of observation (KOPs) for purposes of analysis in the Staff Assessment/EIS.

DATA REQUEST

147. Please provide visual simulations, utilizing 'normal' (50 mm equivalent or approximately 40-degree angle of view), of the following new recreational KOPs: a. Umberci Mine Sec 9, T27S, R14E, (from hill top in NW corner, above mine looking down on site)

Response: A photo has been taken from two locations near the mine looking south toward the site: (1) from a location near an apparent mine camp area, and (2) from a hill slope that is lower in elevation and is closer to the project site than the Umberci Mine. For health and safety reasons, the Applicant's consultant did not access the hill top in the northwest corner as was suggested by the Data Request (it would have required climbing approximately 1,000 to 1,100 feet up a steep slope in hot summer weather). The simulation will be prepared once approval is obtained pursuant to Data Request 148.

b. Benson Mine Sec23, T28S, R13E, (from hill top above mine looking down on site, (via Colosseum Road)

Response: A photo has been taken from the slope above the mine looking toward the site. The simulation will be prepared once approval is obtained pursuant to Data Request 148.

c. I-15 & Nipton Rd. Sec 35,T28S, R14E, (from I-15 off-ramp)

Response: A photo has been taken of the project site from this location. The simulation will be prepared once approval is obtained pursuant to Data Request 148.

d. Nipton Store, Nipton Sec 32, T28S, R16E, SBM

Response: A photo has been taken of the project site from this location. The simulation will be prepared once approval is obtained pursuant to Data Request 148.

e. Ivanpah Dry Lake (East) Sec 32, T27S, R15E, SBM

Response: A photo has been taken of the project site from this location. The simulation will be prepared once approval is obtained pursuant to Data Request 148.

f. Ivanpah Dry Lake (West) Sec 19, T27S, R15E, SBM

Response: A photo has been taken of the project site from this location. The simulation will be prepared once approval is obtained pursuant to Data Request 148.

g. Whiskey Pete's Sec 8, T27S, R15E, SBM

Response: A photo has been taken of the project site from two locations at Whiskey Pete's: (1) from the semi-truck parking lot located on the back side of the hotel building, and (2) from Room 1805 of the 19-floor of Whiskey Pete's hotel building. The simulation will be prepared once approval is obtained pursuant to Data Request 148.

Note that due to the unusually large scale of the proposed project and the high level of topographic exposure of the site over a large viewing area, KOPs extend beyond typical middle-ground distances. A map is attached to indicate recommended locations for KOPs e. and f.

148. Please provide candidate KOP photographs of the above sites for staff review, prior to development of the simulations.

Response: Photos have been taken at the sites listed in Data Request 147. The Applicant's consultant is in the process of scheduling a conference call with the CEC's visual resources specialist consultant (William Kanemoto), and BLM staff (Mona Daniels) during the week of June 9, 2008. If approved, simulations will be developed consistent with those discussions.

BACKGROUND

The proposed solar receiving towers are up to 371 feet in height, and could presumably be located near flight paths for the proposed Ivanpah Airport. FAA safety lighting and painting requirements would represent additional visual effects of the project and affect visual impact evaluation.

DATA REQUEST

149. Please confirm whether FAA safety lighting and painting would be required for the towers. If so, please provide a description of the required lighting or painting.

Response: The project will require medium dual intensity lighting at the top of the receivers probably in several directions around the top. This would result in white lights flashing in the daytime and red lights flashing at night. The lights would be directed outward and upward to be visible for planes.

BACKGROUND

The proposed ISEGS project would require a very large area of grading for site preparation, all or most of it exposed to sensitive viewers in various locations throughout the viewshed. Color contrast of disturbed soil with surrounding undisturbed soil surfaces

due to grading, however, is frequently among the greatest visual effects of infrastructure projects in desert areas, and is often difficult and slow to remediate.

DATA REQUEST

Response: It is important to consider the effects of sight angle on the apparent color and brightness of project area soils. When viewed from the air, it is evident that the project area has been dominated by recent alluvial fan activity (scour and shallow fill resulting from surface runoff). This has resulted in the appearance of a generally bright (high albedo, or surface reflectivity) light buff surface when viewed from the air. Figure DR150-1 provides a representative view demonstrating this. In a related response regarding the age of project area surfaces (see Data Response 40, Set 1B), it was determined that only about 14 percent of the combined area of Ivanpah SEGS 1, 2, and 3 possessed darker low albedo surfaces. Therefore, most of the surface of the project area is quite bright when viewed from directly overhead.

This apparent brightness is reduced when viewed obliquely from the surrounding hills (Figure DR150-2), and is reduced even further (although still evident) in views close to the ground surface (Figure DR150-3). Finally, when viewing the surface from an on-the-ground position, the surface of the project area appears darkest (Figure DR150-4).

Therefore, although the current surface of the project area is generally quite light and possesses a high albedo (Figure DR 150-1), this apparent lightness is affected strongly by the elevation of the viewer. When the viewer is closest to the ground surface, the desert scrub vegetation through which the surface is viewed screens the ground surface, affecting the appearance of the surface's color and albedo by making the surface appear darker despite its actual light-colored ground surface (Figure DR 150-4).

150 Please provide information on the color characteristics of the soil substrate of the ISEGS site, compared to the existing color characteristics of the undisturbed soil surface visible now.

Response: The soil surface at the Ivanpah SEGS site is light and bright in areas that have been either affected by overland flow relatively recently (in geological terms), or that are composed of multiple minerals (Figures DR150-1, DR150-6). In other areas that are stable and are characterized by older alluvial fan surfaces, the soil at the surface is somewhat darker (Figure DR150-7). As indicated in Data Response 40 (Set 1B), these darker surfaces occupy approximately 14 percent of the aggregate surface area of Ivanpah 1, 2, and 3. The color of the subsurface soil at the Ivanpah SEGS site is lighter and brighter than the surface soil at the project site (Figure DR150-5).

Figure DR150-5 shows the colors of the disturbed and undisturbed soils at the existing water well area that is located in the project area, and also along and adjacent to Colosseum Road in the project area. As these photos of existing conditions show, the disturbed soils appear lighter than the adjacent undisturbed areas. It is, therefore, expected that clearing of the land surface for installation of project features would result in a land surface that appears similar to that shown in these photos until project features, such as the heliostats (mirrors) and other project features, are installed. Once the project facilities are installed, much of the ground surface is not expected to be visible. In addition, once the mirrors are installed, it is expected that the viewers' eyes will not be

drawn to the ground surface and the associated color and texture differences in soil, but instead may notice the human-made features that have been installed onsite. It is likely that some viewers will see the project as an interesting change to the landscape, and others will prefer the existing condition view.

151 Please provide proposed mitigation measures for addressing visual impacts resulting from site grading.

Response: The Applicant plans to revegetate areas not needed for active project facilities as soon as practicable after project construction is complete in each area. In addition, the Applicant intends that project facilities such as fences, outbuildings, and the support structures of the heliostat arrays will be painted a weather resistant low-reflectivity grey, tan, or beige paint to reduce visual contrast with the surrounding terrain.

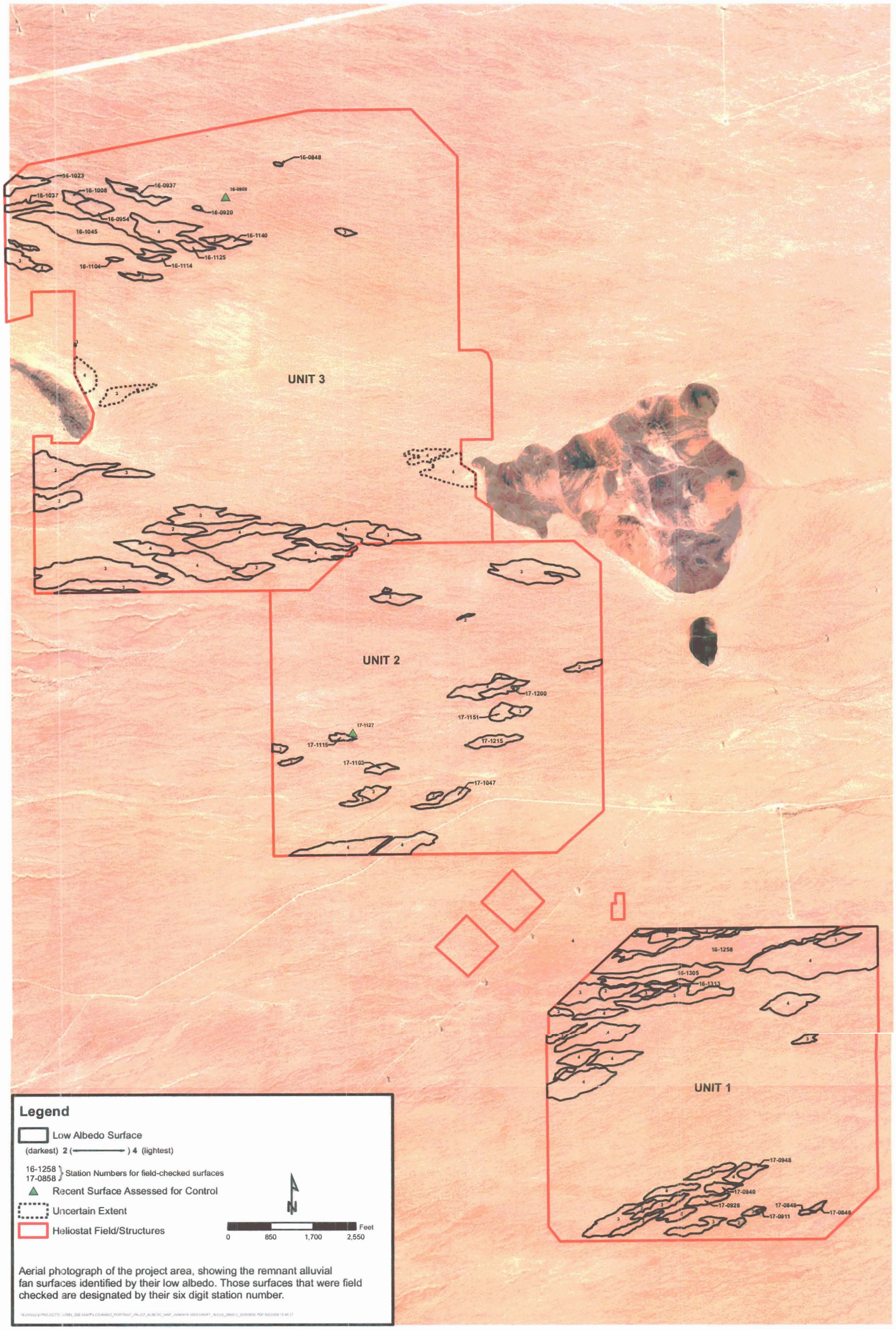


FIGURE DR150-1
LOW ALBEDO ALLUVIAL FAN SURFACES IN THE PROJECT AREA
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

ES062007009SAC DR150-1 ai 6/9/08 afint

View of the project area (mid-ground) looking east from the hills in the vicinity of the Colosseum Mine at about 5,300 feet elevation.

FIGURE DR150-2
VIEW FROM VICINITY OF COLOSSEUM MINE
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

View east of the northern portion of the project area (Ivanpah 3) from the limestone outcrop immediately to the west of the proposed project at about 3,460 feet elevation.

FIGURE DR150-3
VIEW OF IVANPAH 3
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

View west across the same area of Ivanpah 3 portrayed in Figure 150-3, showing the limestone outcrop in the mid-ground, and the aspect of the project area when viewed from ground surface.

FIGURE DR150-4
VIEW OF IVANPAH 3 AREA FROM THE SURFACE
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

View south-southeast to the water well sited along the Colosseum Road, to the east of the Ivanpah 2 heliostat field. The brightness of the cleared area in the foreground is maintained by frequent vehicle disturbance.

FIGURE DR150-5
TYPICAL ASPECT OF A DISTURBED SURFACE
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

View west-northwest showing a relatively stable, high-reflectivity polymineralic surface on Ivanpah 2.

FIGURE DR150-6
VIEW OF STABLE, REFLECTIVE ALLUVIAL SURFACE
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

View west-northwest showing a stable, darker alluvial fan surface.

FIGURE DR150-7
VIEW OF STABLE, DARKER ALLUVIAL SURFACE
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA

APPLICATION FOR CERTIFICATION FOR THE *IVANPAH SOLAR ELECTRIC GENERATING SYSTEM*

DOCKET NO. 07-AFC-5

PROOF OF SERVICE (Revised 4/1/08)

INSTRUCTIONS: All parties shall 1) send an original signed document plus 12 copies OR 2) mail one original signed copy AND e-mail the document to the web address below, AND 3) all parties shall also send a printed OR electronic copy of the documents that shall include a proof of service declaration to each of the individuals on the proof of service:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 07-AFC-5
1516 Ninth Street, MS-14
Sacramento, CA 95814-5512
docket@energy.state.ca.us

APPLICANT

Solar Partners, LLC
John Woolard, Chief Executive Officer
Alicia Torre, Project Manager
1999 Harrison Street, Suite #500
Oakland, CA 94612
ATorre@BrightSourceEnergy.com

Steve De Young
Ivanpah solar Electric Generating System
Project Manager
4155 Arbolado Drive
Walnut Creek, CA 94598
steve4155@astound.net.

APPLICANT'S CONSULTANTS

John L. Carrier, J. D.
2485 Natomas Park Dr. #600
Sacramento, CA 95833-2937
jcarrier@ch2m.com

COUNSEL FOR APPLICANT

Jeffrey Harris
Ellison, Schneider & Harris L.L.P.
Attorneys at Law
2015 H Street
Sacramento, CA 95814-3109
jdh@eslawfirm.com

INTERESTED AGENCIES

Larry Tobias
Ca. Independent System Operator
151 Blue Ravine Road
Folsom, CA 95630
LTobias@caiso.com

Tom Hurshman, Project Manager
Bureau of Land Management
2465 South Townsend Ave.
Montrose, CO 81401
tom_hurshman@blm.gov

Sterling White, Field Manager
Bureau of Land Management
Needles Field Office
1303 South Highway 95
Needles, CA 92363
Sterling_White@blm.gov

INTERVENORS

California Unions for Reliable Energy ("CURE")
Tanya A. Gulesserian
Marc D. Joseph
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com

ENERGY COMMISSION

JEFFREY D. BYRON
Commissioner and Presiding Member
jbyron@energy.state.ca.us

JAMES D. BOYD
Commissioner and Associate Member
jboyd@energy.state.ca.us

Paul Kramer
Hearing Officer
pkramer@energy.state.ca.us

*** Che McFarlin**
Project Manager
Cmcfarli@energy.state.ca.us

Dick Ratliff
Staff Counsel
dratliff@energy.state.ca.us

Public Advisor
pao@energy.state.ca.us

DECLARATION OF SERVICE

I, Haneefah Walker, declare that on June 10, 2008, I deposited copies of the attached All Parties Letter and new Proof of Service List in the United States mail at Sacramento, California with first-class postage thereon fully prepaid and addressed to those identified on the Proof of Service list above.

OR

Transmission via electronic mail was consistent with the requirements of California Code of Regulations, title 20, sections 1209, 1209.5, and 1210. All electronic copies were sent to all those identified on the Proof of Service list above.

I declare under penalty of perjury that the foregoing is true and correct.

Haneefah Walker